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Rangeland Health Evaluation

Ohaco Allotment #03060

Effus Allotment #03030

Douglas Allotment #03026

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Abstract

This Rangeland Health Evaluation is a stand-alone report designed to ascertain compliance with the Arizona Standards for Rangeland Health on the Ohaco, Effus, and Douglas grazing allotments.

Standard One is achieved on this complex of allotments.

Standard Two is not applicable to this complex of allotments.

Standard Three is achieved on the Ohaco and Effus allotments. It is not achieved on the Douglas allotment or at Ohaco Key Area 5.

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 Ohaco, Effus, and Douglas grazing allotments (hereafter the “Ohaco 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 factor causing that non-achievement.

2.0 Complex Profile

2.1 Complex Location

The Ohaco Complex is located south to southeast of the town of Aguila, Arizona. Aguila road bisects the Ohaco Allotment. The Effus allotment is adjacent to the Ohaco allotment, northeast of Black Butte. The Douglas allotment consists of scattered parcels east of Vulture Mine road, southwest of Wickenburg, Arizona. 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 Ohaco Complex are given below.

Land Classification	Ohaco Allotment	Effus Allotment	Douglas Allotment
Public Acres	52,025	14,286	2,036
State Acres	11,035	3,999	24,006
Private Land Acres	854	378	81,156
Local and State Parks	0	0	1,786
Military	0	0	653
Bureau of Reclamation	0	0	505
Total Acres	63,914	18,663	110,142

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 east northeast 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 Ohaco 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
Box Wash	5270	33.8493	-112.7991	11	8.45
Upper Grass Wash	5145	33.8776	-113.091	12	8.23
Dead Horse Wash	5195	33.781	-113.029	14	7.65
Centennial Wash	5180	33.94325	-113.001	33	8.01
Upper Tiger Wash	5130	33.8103	-113.1752	29	8.12
Harquahala Mountain	5185	33.8121	-113.347	21	12.09
Sugarloaf Mountain	5055	33.6913	-113.0936	10	7.44
Daggs Wash	5495	33.7459	-112.7251	6	7.63

2.2.4 Soils Data

Soils data for the Complex are taken from the NRCS soil survey of the Aguila-Carefree area (1986). 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.

2.2.4.1 The Ohaco Allotment

Soils on the Ohaco allotment are typical of desert floor and mountainous soils. Many soils within the allotment are soil complexes and associations, totaling forty four soil types. The majority of these soil complexes and associations are present on less than 4% 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 five soil types that account for 65% of the allotment soils, discussed below:

The first and second most dominant soil map units within the allotment is the Gachado-Lomitas-Rock Outcrop complex, 7-55% slopes, comprising 24 percent of the area and the Gachado-Lomitas complex, 8-25% slopes, comprising 18.2 percent of the area. The Gachado series consists of very shallow and shallow, well drained soils formed in alluvium from volcanic rock. Gachado soils are on hills and mountains with slopes of 0 to 55 percent and elevations from 600 to 3000 feet. Depth to bedrock is between 7-20 inches. The ecological site associated with this soil is the Volcanic Hills 7-10"pz (R040XB222AZ). The Lomitas series consists of shallow, somewhat excessively drained soils formed in alluvium and colluvium. Lomitas soils are on hills and mountains and have slopes of 5 to 65 percent and elevations from 1,000 to 3,000 feet. Depth to bedrock is between 10 and 20 inches. The ecological site associated with this soil is the Volcanic Hills 7-10"pz.

The third most dominant soil within the allotment is the Greyeagle-Continental-Nickel association, 1-40% slopes, comprising 11.3 percent of the area. Greyeagle soils are somewhat excessively drained soils on fan terraces and hillslopes. The soil is derived from mixed alluvium with a depth of 24-60 inches. The ecological site associated with this soil is the Clay Loam Upland 7-10"pz (R040XB205AZ). Continental soils are well drained soils on fan terraces. The soil is derived from alluvium from mixed sources with a depth of 27-60 inches. The ecological site associated with this soil is the Clay Loam Upland 7-10"pz. Nickel soils are well drained soils on fan remnants. The soil is derived from alluvium from mixed rock sources with a depth of 31-60 inches. The ecological site associated with this soil is the Limy Upland 7-10"pz (R040XB210AZ).

The fourth most dominant soil within the allotment is the Gunsight-Cipriano complex, low precipitation, 1-7% slopes, comprising 6.2 percent of the area. The Gunsight series consists of very deep, somewhat excessively drained, strongly calcareous soils that formed in alluvium from mixed sources. Gunsight soils are on fan terraces or stream terraces and have slopes of 0 to 60 percent with elevations from 400 to 2,600 feet. Depth to bedrock is greater than 60 inches. The ecological site associated with this soil is the Limy Upland 3*7"pz Deep (R040XC311AZ). The Cipriano series consists of shallow and very shallow to a hardpan, somewhat excessively drained soils that formed in fan alluvium from volcanic rock. Cipriano soils are on fan terraces and have slopes of 0 to 55 percent with elevations from 500 to 2,200 feet. Depth to bedrock is greater than 60 inches. The ecological site associated with this soil is the Limy Upland 3-7"pz (R040XC310AZ).

The fifth most dominant soil within the allotment is the Vaiva very gravelly loam, 1-20 percent slopes, comprising 5.2 percent of the area. The Vaiva series consists of very shallow and shallow, well drained

soils formed in slope alluvium from granite and gneiss. Vaiva soils are on hills and mountains with slopes of 1 to 65 percent with elevations from 800 to 3,500 feet. Depth to lithic contact is 7-20 inches. The ecological site associated with this soil is the Granitic Upland 7-10"pz (R040XB220AZ).

2.2.4.2 The Effus Allotment

Soils on the Effus allotment are typical of hill soils in the Sonoran desert. Many soils within the allotment are soil complexes and associations, totaling 29 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 five soil types that account for 76% of the allotment soils, discussed below:

The first and second most dominant soil map units within the allotment is the Gran-Wickenburg-Rock Outcrop complex, low precipitation. The 10-65% slopes map unit accounts for 45.9% of the allotment, while the 1-10% slopes map unit accounts for 9.6% of the allotment. The Gran series consists of very shallow and shallow, well drained soils that formed in alluvium-colluvium. Gran soils are on pediments, hillslopes and mountain slopes with gradients of 1 to 65 percent with elevations from 1,800 to 4,000 feet. Depth to bedrock is 20 to 40 inches. The ecological site associated with this soil is the Granitic Hills 7-10"pz (R040XB206AZ). The Wickenburg series consists of shallow, well drained soils that formed in mixed alluvium-colluvium. Wickenburg soils are on pediment hillslopes and mountain slopes with gradients of 1 to 65 percent with elevations from 1,800 to 4,000 feet. Depth to bedrock is 40 to 60 inches or greater in some areas. The ecological site associated with this soil is the Granitic Hills 7-10"pz.

The third most dominant soil map unit within the allotment is the Momoli-Carrizo complex, comprising 8.4% of the allotment. The Momoli series consists of very deep, somewhat excessively drained soils formed in fan alluvium and eolian deposits. Momoli soils are on stream terraces and fan terraces and have slopes of 0 to 15 percent with elevations from 400 to 2,500 feet. The ecological site associated with this soil is the Limy Upland 7-10"pz Deep (R040XB208AZ). The Carrizo series consists of very deep, excessively drained soils formed in mixed igneous alluvium. Carrizo soils are on numerous landforms on flood plains, fan piedmonts and bolson floors. Slopes range from 0 to 15 percent with elevations from 0 to 2,600 feet. In this complex, this soil is associated with the Limy Upland 7-10"pz Deep ecological site.

The fourth most dominant soil map unit within the allotment is the Nickel-Cave complex, low precipitation, 3-30% slopes, comprising 7.3% of the allotment. The Nickel series consists of very deep, well drained soils that formed in alluvium from mixed rock sources. Nickel soils are on fan remnants. Slope ranges from 0 to 35 percent with elevations from 1,800 to 4,000 feet. The ecological site associated with this soil is the Limy Slopes 7-10"pz (R040XB209AZ). The Cave series consists of very shallow and shallow to a hardpan, well drained soils formed in mixed alluvium. Cave soils are on fan remnants, fan piedmonts and stream terraces and have slopes of 0 to 35 percent with elevations from 1,500 to 5,060 feet. Depth to hardpan is 4 to 20 inches. The ecological site associated with this soil is the Limy Upland 7-10"pz.

The fifth most dominant soil map unit within the allotment is the Cipriano very gravelly loam, comprising 5.5% of the allotment. The Cipriano series consists of shallow and very shallow to a hardpan, somewhat excessively drained soils that formed in fan alluvium from volcanic rock. Cipriano soils are on fan terraces and have slopes of 0 to 55 percent with elevations from 500 to 2,200 feet. Depth to duripan is 4 to 20 inches. The ecological site associated with this soil is the Limy Upland 7-10"pz.

2.2.4.3 The Douglas Allotment

Soils on the Douglas allotment are typical of desert floor soils. Many soil units within the allotment are soil complexes and associations, totaling 28 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 five soil types that account for 73% of the allotment soils, discussed below:

The most dominant soil map unit within the allotment is the Gunsight-Rillito complex, low precipitation, 1-40% slopes, accounting for 28.5% of the soils on the allotment. The Gunsight soil series is described above. In this soil complex, the Gunsight soil is associated with the Limy Fan 3-7"pz ecological site (R040XC306AZ). The Rillito series consists of very deep, somewhat excessively drained soils that formed in mixed alluvium. Rillito soils are on fan terraces or stream terraces. Slopes are dominantly 0 to 5 percent, but range to 40 percent with elevations from 400 to 2,200 feet. The ecological site associated with this soil is the Limy Upland 3-7"pz Deep.

The second most dominant soil map unit within the allotment is the Ebon-Pinamt complex, 3-20% slopes, accounting for 13.5% of the soils on the allotment. The Ebon series consists of very deep, well drained soils that formed in mixed alluvium. Ebon soils are on fan terraces and have slopes of 0 to 40 percent with elevations from 850 to 2,290 feet. The ecological site associated with this soil is the Clay Loam Upland 7-10"pz. The Pinamt series consists of very deep, well drained soils that formed in fan alluvium and stream alluvium. Pinamt soils are on fan terraces and stream terraces and have slopes of 0 to 40 percent with elevations from 700 to 3,000 feet. Depth to the base of the argillic horizon is 25 to 40 inches. The ecological site associated with this soil is the Loamy Upland 7-10"pz (R040XB213AZ).

The third most dominant soil map unit within the allotment is the Brios-Carrizo complex, low precipitation, 1-5% slopes, accounting for 12.2% of the soils on the allotment. The Brios series consists of very deep, excessively drained soils that formed in mixed and stratified alluvium. Brios soils are on flood plains and alluvial fans and have slopes of 0 to 5 percent with elevations from 175 to 2,200 feet. This soil is associated with the Sandy Wash 3-7"pz (R040XC318AZ). The Carrizo soil series is described above. In this soil complex, the Carrizo soil is associated with the Sandy Wash 3-7"pz ecological site.

The fourth most dominant soil map unit within the allotment is the Quilotosa-Vaiva-Rock outcrop complex, 20-65% slopes, accounting for 11.8% of the soils on the allotment. The Quilotosa series consists of very shallow and shallow, somewhat excessively drained soils that formed from granitic and metamorphic rocks. Quilotosa soils are on hills and mountains and have slopes of 3 to 65 percent with elevations from 400 to 3,500 feet. Depth to bedrock is 4 to 20 inches. The ecological site associated with this soil is Granitic Hills 7-10"pz. The Vaiva series is described above. In this complex, the Vaiva soil is associated with the Granitic Hills 7-10"pz ecological site.

The fifth most dominant soil map unit within the allotment is the Momoli-Carrizo complex, low precipitation, accounting for 7% of the soils on the allotment. The Momoli-Carrizo soil is described above. In this low precipitation complex, both soils are associated with the Limy Fan 3-7"pz.

2.3 Biological Resources

2.3.1 Major Land Resource Areas

The Ohaco 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). MLRAs 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 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. 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 Ohaco 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 and Section 5, Appendix A, for a list of Ecological Sites and their percentage of Public Lands within the Complex.

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

Granitic Hills 7-10"pz R040XB206AZ

This site occurs on hillslopes and ridgetops. Slopes range from 15 to 65%. Elevations are from 1000 to 2500 feet. Soils are shallow and formed on acid igneous materials. Soils are non-calcareous, coarse textured and have well developed covers of gravels and cobbles. Large areas of rock outcrop and boulder occur up to 25% of the area. Plant-soil moisture relationships are fair. The potential plant community is a diverse mixture of desert trees, shrubs, and cacti. Perennial grass is not a major component of the ecological site. Annual vegetative production is expected to be between 400-625lbs air-dry weight per acre.

Granitic Upland 7-10"pz R040XB220AZ

This site occurs on pediments, undulating uplands in and around the low desert mountains. Slopes range from 1% to 15%. Elevations are from 1000 to 2500 feet. Soils are shallow and very shallow, formed on acid and intermediate igneous parent materials. Soils are non-calcareous, coarse textured with well-developed gravel covers. Rock outcrop makes up a small percentage of the area. Plant-soil moisture relationships are poor. The potential plant community is a mixture of desert trees, shrubs, cacti and perennial forbs and grasses. Annual vegetative production is expected to be between 402 and 513lbs air-dry weight per acre.

Limy Upland 7-10"pz R040XB210AZ

This site occurs on fan terraces, ridgetops, pediments and mesa tops. Slopes are from 1 to 15%. Elevations range from 1000 to 2200 feet. Soils are shallow over strongly cemented lime pans. Soils are

very calcareous, coarse to loamy textured. Surface rock fragments are common. Plant-soil moisture relationships are poor. The potential plant community on this site is a mixture of desert shrubs, cacti, and perennial and annual grasses and forbs. Annual vegetative production is expected to be between 138 and 210 lbs air-dry weight per acre.

Sandy Bottom 3-7"pz, 7-10"pz R040XC318AZ, R040XB

These sites occur in a bottom position. They benefit significantly from run-in moisture from adjacent areas. The soils may suffer from excessive loss from runoff. It occurs as floodplains, low terraces, alluvial fans and drainageways. Slopes are from 0% to 3%. Elevations range from 0 to 1,000 feet for the lower rainfall regime, and 900 to 2,000 feet for the higher rainfall regime. Soils are very young, and of mixed origin. Soils may or may not be calcareous. Plant-soil moisture relationships are poor in the lower rainfall regime, but tend to be good due to the extra moisture received in the higher rainfall regime. Annual vegetative production is expected to be between 950 and 1675lbs air-dry weight per acre in the lower rainfall regime, and between 1650 and 2775lbs air-dry weight in the higher rainfall regime.

Volcanic Hills 7-10"pz R040XB210AZ

This site occurs on hillslopes and ridge tops with slopes ranging from 15-65% and elevations from 1000' to 2500'. Soils are shallow and formed on intermediate igneous material. Soils are slightly calcareous, loamy textured and have very well developed covers of cobble, stones and gravel. Rock outcrops can account for up to 35% of the area. Plant-soil moisture relationships are fair to good. 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 450-575lbs air-dry weight per acre.

2.3.3 General Wildlife Resources

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

2.3.4 Special Status Species, T&E

Sonoran desert tortoises (*Gopherus morafkai*), a BLM sensitive species, occupy much of the upland areas in the Ohaco Complex. The desert tortoise distribution within the Complex is not uniform. 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 Ohaco complex contains category II and III desert tortoise habitat. Category II 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 acreages of desert tortoise habitat on public lands within the complex.

Allotment	Category 1 Acres	Category 2 Acres	Category 3 Acres
Ohaco	0	41,505	6,170
Effus	0	13,625	357
Douglas	0	4	331

2.4 Special Management Areas

The southern portion of the Ohaco allotment contains 3,564 public acres of the Hummingbird Springs wilderness.

The Harquahala Herd Area encompasses 32,569 acres of the allotment. The Harquahala Herd Area (HHA) was established in the mid to late 1970s based on the presence of burros at the time of survey efforts. It was determined at that time that sufficient resources were not available to sustain a healthy, self-sustaining population of burros to be in ecological balance with their surroundings and was gathered to remove burros from the area. The HHA is an unmanaged area for burros and according to the 2010 BH RMP, management action HB-5: "The Harquahala Herd Area... will not be managed as a Herd Management Area. Burros will be removed from the herd area, as funding is available, with the target reaching a population of zero." Funding has not been available to accomplish the target number of zero animals at this time, and it is unknown as to when funding will be acquired to meet the objectives set forth in the 2010 Resource Management Plan for the HAA.

2.5 Recreational Resources

The complex contains 192 miles of existing routes, which are all currently open to all travel modes.

By allotment, miles of routes in each are as follows:

Ohaco- 152.4 miles

Effus – 33.7 miles

Douglas - 6.6 miles

The complex contains 19 miles of improved roads consisting of paved, regularly graded county roads or right-of-way roads to gravel pits or homes. All other roads are primitive roads with little or no maintenance occurring.

General public access

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 holder for the Ohaco allotment is the Cooper Cattle Company. The current permittee acquired the base property in 1998. The allotment is divided into three pastures. There is no formal rotation system in place on the allotment, however, livestock are normally cycled from the southern pastures to the northern pastures based on forage availability and annual production.

The current permit holder for the Effus allotment is Rosalie Palen. The current permittee acquired the base property in 1999. The allotment is divided into three pastures. There is no formal rotation system in place on the allotment.

The Douglas allotment does not have a grazing authorization currently. The prior permittee relinquished their base property preference in 2007. Land exchanges since 1980 have reduced the public land acreage of the Douglas from approximately 11,500 acres to the current acreage of 2,036 acres. A significant portion of the remaining acreage is associated with the Central Arizona Project canal and is unavailable for livestock grazing.

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 Ohaco allotment is a perennial/ephemeral grazing permit. Additional livestock beyond the base stocking rate may be allowed on the allotment during years of additional, seasonal forage availability with prior approval. The Effus and Douglas allotments are perennial allotments. 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
Ohaco	03060	150	Cattle	82	Active/Ephemeral	1476
Effus	03030	125	Cattle	77	Active	1155
Douglas	03026	300	Cattle	4	Active	144

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. All three allotments within the Complex are Section 3 grazing permits.

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 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 Ohaco 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 Ohaco Complex.

There are 10 active Key Areas on the Ohaco Complex. The Ohaco allotment contains 8 Key Areas. Key Area 1 was abandoned in 1986. The Effus contains 2 Key Areas. The Douglas contains 1 Key Area. The table below shows the active key areas on the complex:

Allotment	Key Area	Ecological Site
Ohaco	KA1	ABANDONED
	KA2	Volcanic Hills 7-10"pz
	KA3	Granitic Hills 7-10"pz
	KA4	Volcanic Hills 7-10"pz
	KA5	Limy Upland 7-10"pz
	KA6	Granitic Upland 7-10"pz
	KA7	Limy Upland 7-10"pz
	KA8	Sandy Wash 7-10"pz
Effus	KA1	Granitic Hills 7-10"pz
	KA2	Granitic Hills 7-10"pz
Douglas	KA1	Sandy Wash 3-7"pz

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-Harquahala 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 3- Desired Resource Condition Objectives

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 are consistent with the Sonoran desert tortoise habitat requirements based on the potential for the site.

Ohaco Allotment

Volcanic Hills 7-10" p.z

- Maintain perennial grass species composition at $\geq 5\%$
- Maintain palatable browse species composition at $\geq 20\%$
- Maintain vegetative foliar cover of $\geq 15\%$
- Maintain a Bare Ground cover class of $\leq 15\%$

Rationale:

Rationale for DPC objectives is taken from the NRCS Volcanic Hills 7-10" p.z. Reference Sheet (R040XB222AZ). The reference sheet shows an expected foliar cover of 10-20%, of which 2-5% is shrubs and 1-2% is half shrubs. There is no expected grass foliar cover on the site per the reference sheet. The ecological site guide shows a grass component of 2-5%. Maintaining a grass component of 5% or greater will maintain important forage for desert tortoise and is appropriate for the site. This site, in the reference stat, calls for between 10-20% canopy cover. 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. Maintaining a palatable browse composition of 20% or greater will provide adequate forage on the site. Bare ground cover class is expected to be between 1-5% in the reference state. Maintaining a bare ground cover class of 15% or less is appropriate to this site due to its slope, vegetative community, and low gravel cover, and will prevent accelerated erosion of the site above what is expected in the reference state.

Ohaco Key Areas 2 and 4 fall within the Volcanic Hills ecological site.

Limy Upland 7-10" p.z

- Maintain perennial grass composition $\geq 5\%$
- Maintain palatable browse species composition at $\geq 15\%$
- Maintain vegetative foliar cover of $\geq 20\%$
- Maintain a Bare Ground cover class of $\leq 20\%$

Rationale:

Rationale for DPC objectives is taken from the NRCS Limy Upland 7-10" p.z. Reference Sheet. The reference sheet does not show an expected foliar cover for perennial grasses. The ecological site guide shows grasses composing 1-6% of the plant community. The perennial grass objective is appropriate to the site and will maintain important forage for desert tortoise. The reference sheet shows an expected foliar cover of 20-25%, of which 50% is shrubs and 20% is trees. Maintaining a vegetative foliar cover of 20% or greater is appropriate to the site due to its aspect and slope, and will prevent accelerated erosion of the site. Maintaining a palatable browse composition of 20% or greater will provide adequate forage on 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 this site due to its slope and gravel cover, and will prevent accelerated erosion of the site above what is expected in the reference state.

Ohaco Key Areas 5 and 7 fall within the Limy Upland ecological site.

Granitic Hills 7-10"pz

- Maintain perennial grass composition $\geq 10\%$
- Maintain palatable browse species composition at $\geq 15\%$
- Maintain vegetative foliar cover of $\geq 20\%$
- Maintain a Bare Ground cover class of $\leq 15\%$

Rationale:

Rationale for DPC objectives is taken from the NRCS Granitic Hills 7-10" p.z. Reference Sheet (R040XB206AZ). The reference sheet shows a perennial grass cover of 1-2%, and the ecological site guide shows a perennial grass composition between 2-6%. The perennial grass objective exceeds the reference state and will maintain important forage for desert tortoise. The reference sheet shows an expected canopy cover of 15-20%, of which 50% is shrubs, 23% trees, and 1-2% perennial grass. Maintaining a vegetative foliar cover of 20% or greater is appropriate to the site due to its aspect and slope, and will prevent accelerated erosion of the site. Maintaining a palatable browse composition of 15% or greater will provide adequate forage on the site. Bare ground cover class is expected to be between 1-15% in the reference state. Maintaining a bare ground cover class of 15% or less is appropriate to this site due to its slope and will prevent accelerated erosion of the site above what is expected in the reference state.

Ohaco Key Area 3 falls within the Granitic Hills ecological site.

Granitic Upland 7-10"pz

- Maintain perennial grass composition $\geq 10\%$
- Maintain palatable browse species composition at $\geq 20\%$
- Maintain vegetative foliar cover of $\geq 20\%$
- Maintain a Bare Ground cover class of $\leq 10\%$

Rationale:

Rationale for DPC objectives is taken from the NRCS Granitic Upland 7-10" p.z. Reference Sheet (R040XB220AZ). The reference sheet shows a perennial grass cover of 1-2%, and the ecological site guide shows a perennial grass composition between 2-6%. The perennial grass objective exceeds the reference state and will maintain important forage for desert tortoise. The reference sheet shows an expected canopy cover of 15-20%, of which 50% is shrubs, 23% trees, and 1-2% perennial grass. Maintaining a vegetative foliar cover of 20% or greater is appropriate to the site due to its aspect and slope, and will prevent accelerated erosion of the site. Maintaining a palatable browse composition of 15% or greater will provide adequate forage on the site. Bare ground cover class is expected to be between 1-15% in the reference state. Maintaining a bare ground cover class of 15% or less is appropriate to this site due to its slope and will prevent accelerated erosion of the site above what is expected in the reference state.

Ohaco Key Area 6 falls within the Granitic Upland ecological site.

Sandy Wash 7-10" p.z

- Maintain palatable browse species composition at $\geq 30\%$
- Maintain vegetative foliar cover of $\geq 60\%$
- Maintain a Bare Ground cover class of $\leq 10\%$

Rationale:

Rationale for DPC objectives is taken from the NRCS Sandy Wash 7-10" p.z. Reference Sheet (R040XB216AZ). The reference sheet shows a cover from 10-30% perennial grass, and the ecological site guide shows a perennial grass composition between 5-9%. Due to the incised nature of this site, a perennial grass component was not developed. Bank steepness limits water availability on the site for shallow rooted species. The reference sheet shows an expected foliar cover of 60-70%, of which 40% is shrubs, 10% subshrubs, and 5-10% trees. Maintaining a vegetative foliar cover of 60% or greater is appropriate to the site due to its slope and the incised nature of the banks, and will prevent accelerated erosion of the site. Maintaining a palatable browse composition of 30% or greater will provide adequate forage on the site. Bare ground cover class is expected to be between 15-40% in the reference state. Maintaining a bare ground cover class of 10% or less is appropriate to this site due to its low slope gradient and will prevent accelerated erosion of the site above what is expected in the reference state.

Ohaco Key Area 8 falls within the Sandy Wash ecological site.

Effus Allotment

Granitic Hills 7-10" p.z

- Maintain perennial grass composition $\geq 20\%$
- Maintain palatable browse species composition at $\geq 15\%$
- Maintain vegetative foliar cover of $\geq 20\%$
- Maintain a Bare Ground cover class of $\leq 10\%$

Rationale:

Rationale for DPC objectives is taken from the NRCS Granitic Hills 7-10" p.z. Reference Sheet (R040XB206AZ). The reference sheet shows a perennial grass cover of 1-2%, and the ecological site guide shows a perennial grass composition between 2-6%. The perennial grass objective exceeds the reference state and will maintain important forage for desert tortoise. The reference sheet shows an expected canopy cover of 15-20%, of which 50% is shrubs, 23% trees, and 1-2% perennial grass. Maintaining a vegetative foliar cover of 20% or greater is appropriate to the site due to its aspect and slope, and will prevent accelerated erosion of the site. Maintaining a palatable browse composition of 15% or greater will provide adequate forage on the site. Bare ground cover class is expected to be between 1-15% in the reference state. Maintaining a bare ground cover class of 10% or less is appropriate to this site due to its slope and will prevent accelerated erosion of the site above what is expected in the reference state.

Effus Key Areas 1 and 2 fall within the Granitic Hills ecological site.

Douglas Allotment
Sandy Wash 3-7"pz

- Maintain palatable browse species composition at $\geq 20\%$
- Maintain vegetative foliar cover of $\geq 40\%$
- Maintain a Bare Ground cover class of $\leq 20\%$

Rationale:

Rationale for DPC objectives is taken from the NRCS Sandy Wash 3-7" p.z. Reference Sheet (R040XB318AZ). The reference sheet shows a cover from 10-30% perennial grass, and the ecological site guide shows a perennial grass composition between 39-60%. A perennial grass component was not developed for this site because perennial grasses were absent, with no available seed source in the area. The reference sheet shows an expected foliar cover of 60-70%, of which 40% is shrubs, 10% subshrubs, and 5-10% trees. Maintaining a vegetative foliar cover of 40% or greater is appropriate to the site due to its slope and the incised nature of the banks, and will prevent accelerated erosion of the site. Maintaining a palatable browse composition of 20% or greater will provide adequate forage on the site. Bare ground cover class is expected to be between 15-40% in the reference state. Maintaining a bare ground cover class of 20% or less is appropriate to this site due to its low rainfall regime and slope, 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 Ohaco 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 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 except for Ohaco Key Area 7 were conducted using Pace Frequency, Dry Weight Rank, and Point Cover for the 2005-2015 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.

Ohaco Key Area 7 was conducted using Line Intercept, Point Cover, and Belt Density transects because of the low cover nature of the site.

Utilization data was collected at each Key Area using the Key Species method from 2013-2015. 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 Ohaco Complex. Livestock numbers provided in the tables below are based on actual use reports as available, and billed use. Ephemeral years on the Ohaco allotment are based on actual billings. Due to multiple turnout and gather dates, the ephemeral numbers have been simplified to show the average number of animals on the allotment during the ephemeral season.

6.1.1 Ohaco

<u>Number of Active Livestock</u>	<u>Kind</u>	<u>Type Use</u>	<u>Grazing Begin</u>	<u>Period End</u>	<u>%PL</u>	<u>AUM"s</u>
472	Cattle	Ephemeral	2/6/15	5/15/15	82	1261
45	Cattle	Active	3/1/14	2/28/15	82	443
532	Cattle	Ephemeral	4/2/13	6/15/13	82	1076
150	Cattle	Active	3/1/13	2/28/14	82	1476
799	Cattle	Ephemeral	2/22/13	4/1/13	82	840
473	Cattle	Ephemeral	3/30/12	5/20/12	82	663
75	Cattle	Active	3/1/12	2/28/13	82	738
150	Cattle	Active	3/1/11	2/28/12	82	1476

150	Cattle	Active	3/1/10	2/28/11	82	1476
1200	Cattle	Ephemeral	2/11/10	5/31/10	82	3560
141	Cattle	Active	9/1/09	2/28/10	82	688
136	Cattle	Active	3/1/09	9/1/09	82	678
1337	Cattle	Ephemeral	1/15/09	5/3/09	82	3930
146	Cattle	Active	9/1/08	2/28/09	82	712
743	Cattle	Ephemeral	3/2/08	5/15/08	82	1502
147	Cattle	Active	3/1/08	9/1/08	82	733
147	Cattle	Active	9/1/07	2/28/08	82	717
150	Cattle	Active	3/1/07	9/1/07	82	748
150	Cattle	Active	3/1/06	2/28/07	82	1476
150	Cattle	Active	3/1/04	2/28/05	82	1476

6.1.2 Effus

Number of Active Livestock	Kind	Grazing Begin	Period End	%PL	AUM"s
125	Cattle	3/1/14	2/28/15	77	1155
125	Cattle	3/1/13	2/28/14	77	1155
85	Cattle	3/1/12	2/28/13	77	786
125	Cattle	3/1/11	2/28/12	77	1155
67	Cattle	3/1/10	2/28/11	77	619
125	Cattle	3/1/09	2/28/10	77	1155
125	Cattle	3/1/08	2/28/09	77	1155
125	Cattle	3/1/07	2/28/08	77	1155
125	Cattle	3/1/06	2/28/07	77	1155
125	Cattle	3/1/05	2/28/06	77	1155
125	Cattle	3/1/04	2/28/05	77	1155

6.1.3 Douglas

Number of Active Livestock	Kind	Grazing Begin	Period End	%PL	AUM"s
0	Cattle	3/1/2005	2/28/2015	4	0

7.0 Conclusions

7.1 Upland Health Conclusions

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

Allotment	Key Area	Standard One	Standard Three
Ohaco	KA2	Achieved	Achieved
	KA3	Achieved	Achieved

	KA4	Achieved	Achieved
	KA5	Achieved	Not Achieved
	KA6	Achieved	Achieved
	KA7	Achieved	Achieved
	KA8	Achieved	Achieved
Effus	KA1	Achieved	Achieved
	KA2	Achieved	Achieved
Douglas	KA1	Achieved	Not Achieved

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 and Point Cover study methods or on Belt Density and Line Intercept 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, "Ohaco Complex Plant List". Vegetative foliar cover and bare ground cover class results are based on point cover data.

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 Ohaco allotment

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 minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a "Slight to Moderate Departure" from the reference state. Reference Section 2.1.1 of Appendix A.

Standard Three: Standard is achieved on this site.

- Maintain perennial grass species composition at $\geq 5\%$ ACHIEVED
- Maintain palatable browse species composition at $\geq 20\%$ ACHIEVED
- Maintain vegetative foliar cover of $\geq 15\%$ ACHIEVED
- Maintain a Bare Ground cover class of $\leq 15\%$ ACHIEVED

Rationale:

This key area meets objectives for perennial grass species, with a perennial grass composition of 5%. Palatable browse composition objectives are met for desert tortoise, with slightly less than 51% of the plant community. Browse composition objectives are met for mule deer, at slightly more than 73% of the plant community. Vegetative foliar objectives are met, with a foliar cover of 15%. Bare ground cover class objectives are met, with a bare ground cover class of 1.5%.

Trend:

Prior pace frequency studies conducted on the site show a reduction in Pleuraphis species across the last 30 years, from 14% to 2%. Woody species, particularly less palatable woody species, have generally maintained similar frequencies or increased gradually, such as Whitethorn Acacia, which has increased in frequency from 4.5 to 11%. Browse species important to mule deer, particularly Ratany, have slightly increased in occurrence on the site, from 4 to 5.5%. Utilization levels in the 1980s and 1990s were slight to light. With the decrease in grass species abundance, utilization levels have increased on the site. 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 the monsoon season.

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 “Slight to Moderate Departure” from the reference state. Reference Section 2.1.1 of Appendix A.

Standard Three: Standard is achieved on this site.

- | | |
|--|----------|
| • Maintain perennial grass composition $\geq 10\%$ | ACHIEVED |
| • Maintain palatable browse species composition at $\geq 15\%$ | ACHIEVED |
| • Maintain vegetative foliar cover of $\geq 20\%$ | ACHIEVED |
| • Maintain a Bare Ground cover class of $\leq 15\%$ | ACHIEVED |

Rationale:

This key area meets objectives for perennial grass species, with a perennial grass composition of slightly more than 20%. Palatable browse composition objectives are met for desert tortoise, at slightly more than 57% of composition. Browse composition objectives are met for mule deer, at slightly less than 53% of composition. 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 6%.

Trend:

Perennial grass frequency has oscillated on this site. Pleuraphis species had increased during the late 1980s and early 1990s, and are currently slightly below 1982 levels, at 25.5% frequency versus 28.0% frequency, respectively. Succulents greatly increased in frequency in the late 1980s, and have returned to levels at or slightly below what was observed in 1982. Larger woody species, such as Parkinsonia, Larrea, and Lycium have increased consistently since 1982. Utilization on this site has varied significantly since the site was established, however, most years utilization was in the slight to light category. Increases in woody vegetation is expected with prolonged drought on this ecological site. Grass recruitment appears to be stable across 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 2.1.1 of Appendix A.

Standard Three: Standard is achieved on this site.

- | | |
|--|--------------|
| • Maintain perennial grass species composition at $\geq 5\%$ | NOT ACHIEVED |
| • Maintain palatable browse species composition at $\geq 20\%$ | ACHIEVED |
| • Maintain vegetative foliar cover of $\geq 15\%$ | ACHIEVED |
| • Maintain a Bare Ground cover class of $\leq 15\%$ | ACHIEVED |

Rationale:

Perennial grass composition objectives are not met on this site, with a perennial grass composition of slightly more than 2%. Palatable browse objectives for desert tortoise are met on this site, at slightly more than 50% of composition. Browse objectives for mule deer are met on this site, at slightly more than 52% of composition. Vegetative foliar cover objectives are met on this site, with a foliar cover of 22%. Bare ground cover class objectives are met on this site, with a bare ground cover class of 1%.

Utilization on this site has been slight. It is unlikely that the utilization level is a causal factor for the non-achievement of the perennial grass objective on this site.

Key Area 5

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 not achieved on this site.

- | | |
|--|--------------|
| • Maintain perennial grass composition $\geq 5\%$ | ACHIEVED |
| • Maintain palatable browse species composition at $\geq 15\%$ | NOT ACHIEVED |
| • Maintain vegetative foliar cover of $\geq 20\%$ | NOT ACHIEVED |
| • Maintain a Bare Ground cover class of $\leq 20\%$ | ACHIEVED |

Rationale:

Perennial grass composition objectives are met on this site, with a perennial grass composition of slightly less than 10%. Palatable browse composition objectives are not met on this site for desert tortoise. While approximately 43% of the browse community meets tortoise palatability, and slightly more than 45% of the browse community is palatable to mule deer, the availability and relative desirability of this forage is not high enough to warrant meeting objectives. Vegetative foliar cover objectives are not met on this site, with a foliar cover of 13.4%. Bare ground cover class requirements are met on this site, with a bare ground cover class of 10.9%.

Utilization on this site was light. It is unlikely that livestock grazing is causing undue degradation to the site or a causal factor for the non-achievement of the browse and foliar cover objectives.

Key Area 6

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 perennial grass composition $\geq 10\%$ | ACHIEVED |
| • Maintain palatable browse species composition at $\geq 20\%$ | ACHIEVED |
| • Maintain vegetative foliar cover of $\geq 20\%$ | ACHIEVED |
| • Maintain a Bare Ground cover class of $\leq 10\%$ | NOT ACHIEVED |

Rationale:

The perennial grass composition objective is met on this site, with a perennial grass composition of slightly less than 21%. Palatable browse composition is met on this site for desert tortoise, at slightly more than 48% of composition. Browse composition objectives are met for mule deer, at slightly less than 48% of composition. Vegetative foliar cover objectives are met on this site, with a foliar cover of 26.4%. Bare ground cover class objectives are not met on this site, with a bare ground cover class of 17.3%.

Utilization on this key area was negligible. It is unlikely that livestock are the causal factor for the non-achievement of the bare ground cover class objective.

Key Area 7

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 perennial grass composition $\geq 5\%$ | ACHIEVED |
| • Maintain palatable browse species composition at $\geq 15\%$ | NOT ACHIEVED |
| • Maintain vegetative foliar cover of $\geq 20\%$ | ACHIEVED |
| • Maintain a Bare Ground cover class of $\leq 20\%$ | ACHIEVED |

Rationale:

The perennial grass composition objective is met on this site, with a perennial grass composition of nearly 57%. The majority of grasses on the site are short-lived perennial species. Palatable browse composition objectives are not met on this site for desert tortoise. While approximately 36% of the browse community meets tortoise palatability, and slightly more than 37% of the browse community is palatable to mule deer, the availability and relative desirability of this forage is not high enough to warrant meeting objectives. Foliar cover objectives are met on this site, with a foliar cover of 21.8%. Bare ground cover class objectives are met on this site, with a bare ground cover class of 7.9%.

Utilization on this key area was slight. It is unlikely that livestock are the causal factor for the non-achievement of the palatable browse species objective.

Key Area 8

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 palatable browse species composition at $\geq 30\%$ | ACHIEVED |
| • Maintain vegetative foliar cover of $\geq 60\%$ | ACHIEVED |
| • Maintain a Bare Ground cover class of $\leq 10\%$ | NOT ACHIEVED |

Rationale:

Palatable browse composition objectives are met on this site for desert tortoise, at slightly more than 53% of composition. Browse composition objectives are met for mule deer, at 83% of composition. Foliar cover objectives are met on this site, with a foliar cover of 72%. Bare ground cover class objectives are not met on this site, with a bare ground cover class of 20%.

Utilization on this site was slight. It is unlikely that livestock are the causal factor for the non-achievement of the bare ground cover class objective.

7.1.2 Effus 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 achieved on this site.

- | | |
|--|----------|
| • Maintain perennial grass composition $\geq 20\%$ | ACHIEVED |
| • Maintain palatable browse species composition at $\geq 15\%$ | ACHIEVED |
| • Maintain vegetative foliar cover of $\geq 20\%$ | ACHIEVED |
| • Maintain a Bare Ground cover class of $\leq 10\%$ | ACHIEVED |

Rationale:

The perennial grass composition objective is met on this site, with a perennial grass composition of slightly less than 40%. Palatable browse composition objectives are met for desert tortoise, at slightly more than 40% of composition. Browse objectives are met for mule deer, at slightly less than 55% of composition. The vegetative foliar cover objective is met on the site, with a foliar cover of 21.5%. The bare ground cover class objective is met, with a bare ground cover class of 3.5%.

Trend:

Perennial grass on this site appears to be stable. Prior studies identified the dominant grass as *Pleuraphis rigida*, however, the most recent studies identified this grass as *Pleuraphis mutica*. These species are directly comparable in life cycle, nutrition, and palatability. Woody species have remained stable or increased slightly, with the exception of *Menodora*, which has increased from 0.5% frequency to 16.5%, and *Eriogonum fasciculatum*, which has decreased from 31.0% to 19.0%. Both are highly palatable to both livestock and wildlife. Utilization on the site has been higher in recent studies than in the past on perennial grasses, and where noted, browse utilization at this site has been consistently high. Livestock grazing may be contributing to vegetation shifts in composition relating to palatable browse species.

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 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 2.2.2 of Appendix A.

Standard Three: Standard is achieved on this site.

- Maintain perennial grass composition $\geq 20\%$ ACHIEVED
- Maintain palatable browse species composition at $\geq 15\%$ ACHIEVED
- Maintain vegetative foliar cover of $\geq 20\%$ ACHIEVED
- Maintain a Bare Ground cover class of $\leq 10\%$ ACHIEVED

Rationale:

The perennial grass composition objective is met on this site, with a perennial grass composition of slightly more than 25%. The majority of grasses on the site are short-lived perennial species. Palatable browse composition objectives are met for desert tortoise, at 52% of composition. Browse objectives are met for mule deer, at slightly more than 62%. Vegetative foliar cover objectives are met on this site, with a foliar cover of 29%. Bare ground cover class objectives are met on this site, with a bare ground cover class of 4.4%.

Trend:

Perennial grass species on this site have generally declined since the site was established. *Pleuraphis* species have declined from 24.5% frequency to 3.4% frequency. *Dasyochloa* species have increased from 1% frequency to 21%. *Dasyochloa* grasses tend to be short-lived perennials with limited palatability. Browse species have generally remained constant, with *Eriogonum fasciculatum* decreasing from 34% to 22.3% frequency, and *Krameria erecta* increasing from 3.5% to 6.8% frequency. Utilization on this site is moderate. This site is located directly between, and within 1/4 mile of, two livestock waters along a pipeline in the Outlaw pasture. Constant livestock use of the site yearlong coupled with prolonged drought is the most probably causal factor for removal of perennial grass species and declines in palatable browse species.

7.1.1 Douglas 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 2.3.1 of Appendix A.

Standard Three: Standard is not achieved on this site.

- | | |
|--|--------------|
| • Maintain palatable browse species composition at $\geq 20\%$ | ACHIEVED |
| • Maintain vegetative foliar cover of $\geq 40\%$ | NOT ACHIEVED |
| • Maintain a Bare Ground cover class of $\leq 20\%$ | NOT ACHIEVED |

Rationale:

The palatable browse composition objective is met for desert tortoise, at slightly more than 57% of composition. The browse objective for mule deer is met, at slightly less than 65% of composition. The vegetative cover objective is not met, with a foliar cover of 8%. The bare ground cover class objective is not met, with a bare ground cover class of 24%.

Livestock have not been present on the allotment for at least a decade. It is unlikely that current livestock management has been a causal factor for non-achievement of the standard.

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 permits. 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 on Sandy Wash sites and 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. Given the number of active livestock waters and number of major drainages within the complex, this is expected to more evenly distribute livestock across the uplands, reducing grazing pressure along the banks of washes.

The Ohaco allotment would benefit from additional pasture fencing in the large northern pasture. This would allow for greater control of ephemeral (seasonal) turnouts of livestock, and reducing the impacts to areas of the ranch that produce greater perennial forage.

The Effus ranch should implement a pasture rotation system to reduce grazing pressure on the Outlaw pasture during the monsoonal growing season until perennial grasses reestablish in the area. Development of additional livestock water in the South pasture would facilitate this management change.

9.0 List of Preparers

Name	Title
James Holden	Rangeland Management Specialist
Codey Carter	Wildlife Biologist
Steve Bird	Wild Horse and Burro Specialist
Mary Skordinsky	Recreation Specialist
Tom Bickauskas	Travel Management Specialist

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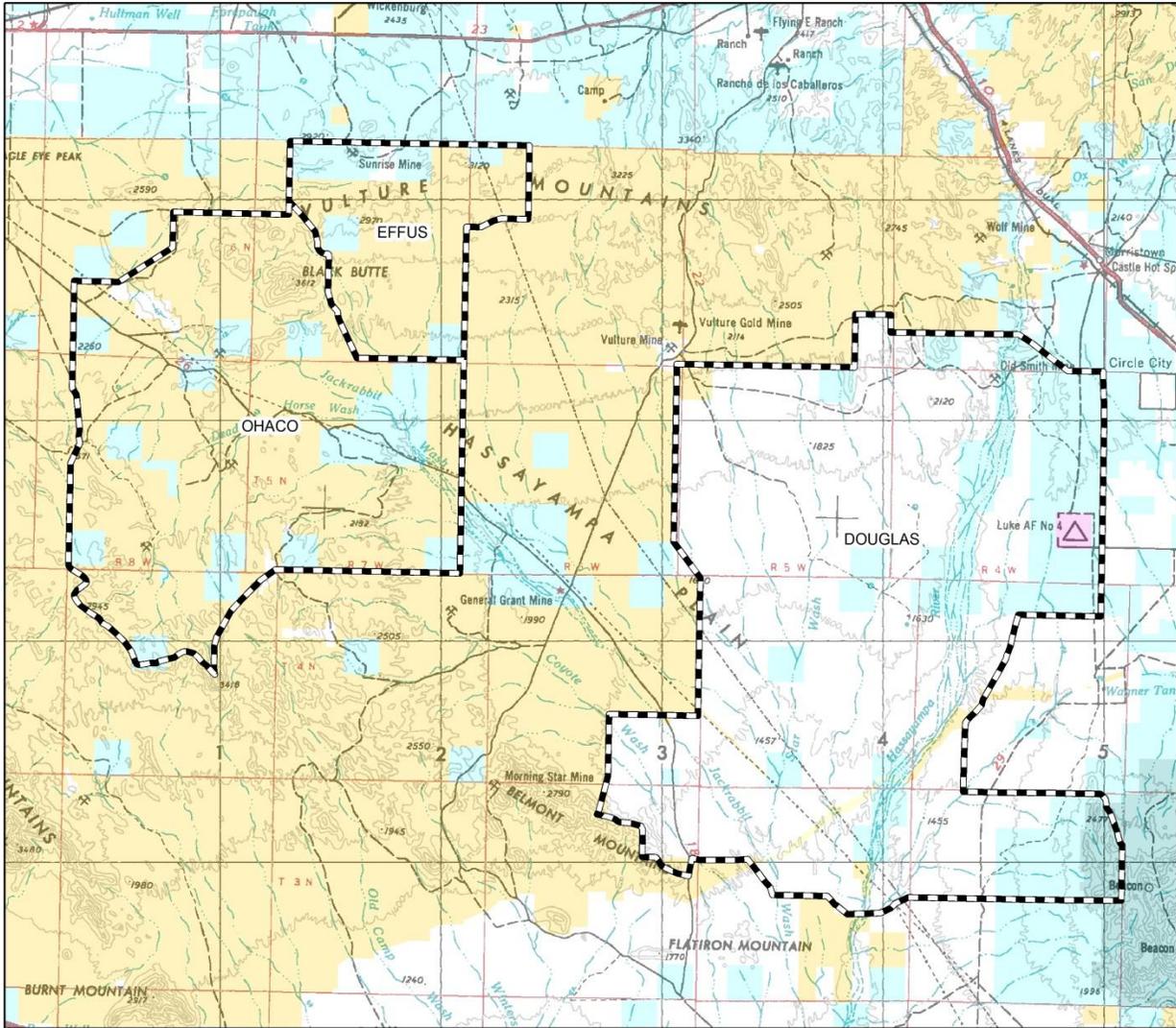
Ohaco Complex Data Appendices

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1.0 Complex Maps

Map 1, Ohaco Complex Boundaries
Ohaco Complex



Legend

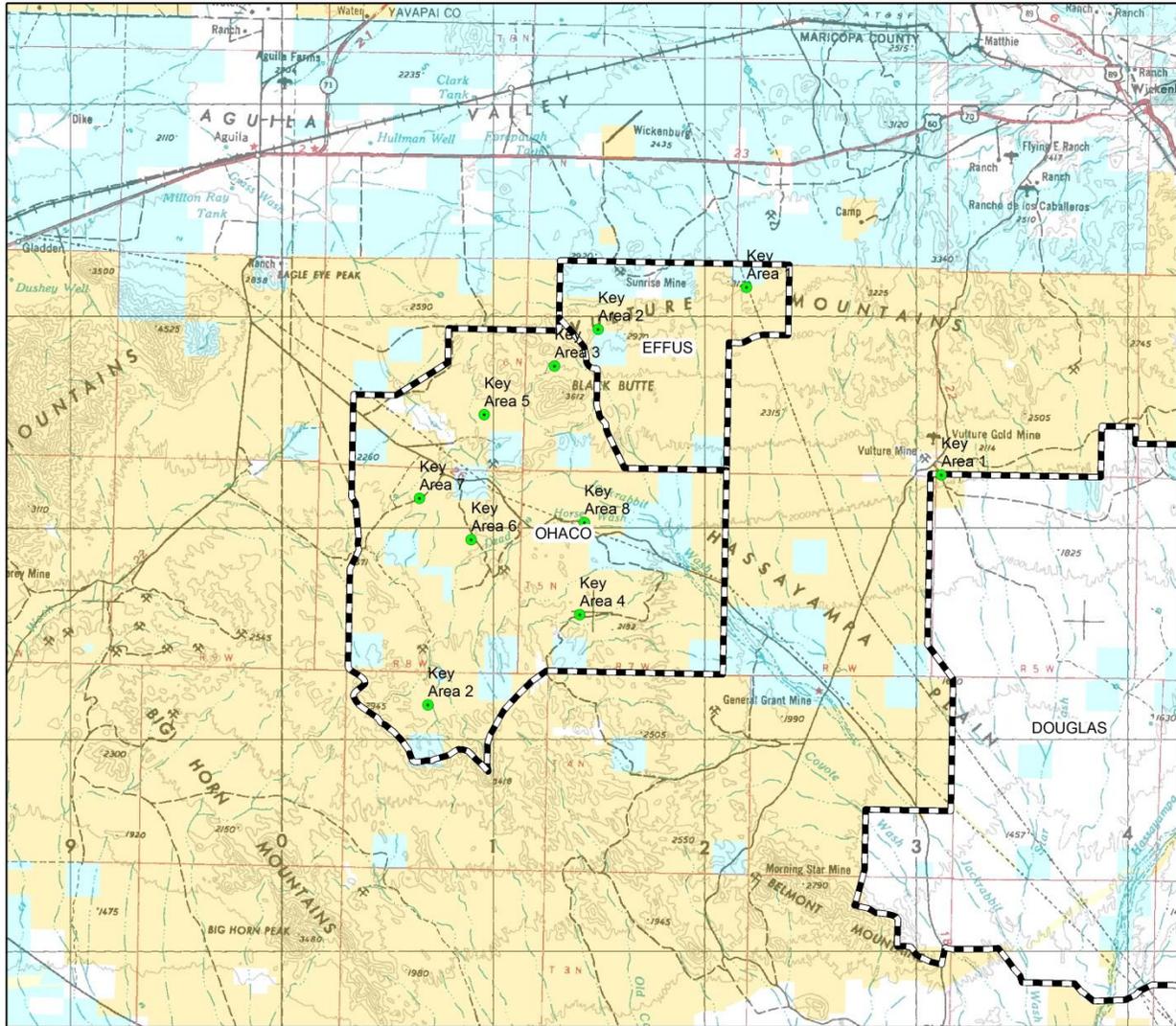
Ohaco Complex Boundaries	Land Management	Indian Lands	Private
	CATEGORY	Local or State Parks	State
BLM	Military	State Wildlife Area	USFS
BR	NPS	USFS	USFWS
County	Other		



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Map 2, Ohaco Complex Key Areas

Ohaco Complex Key Areas



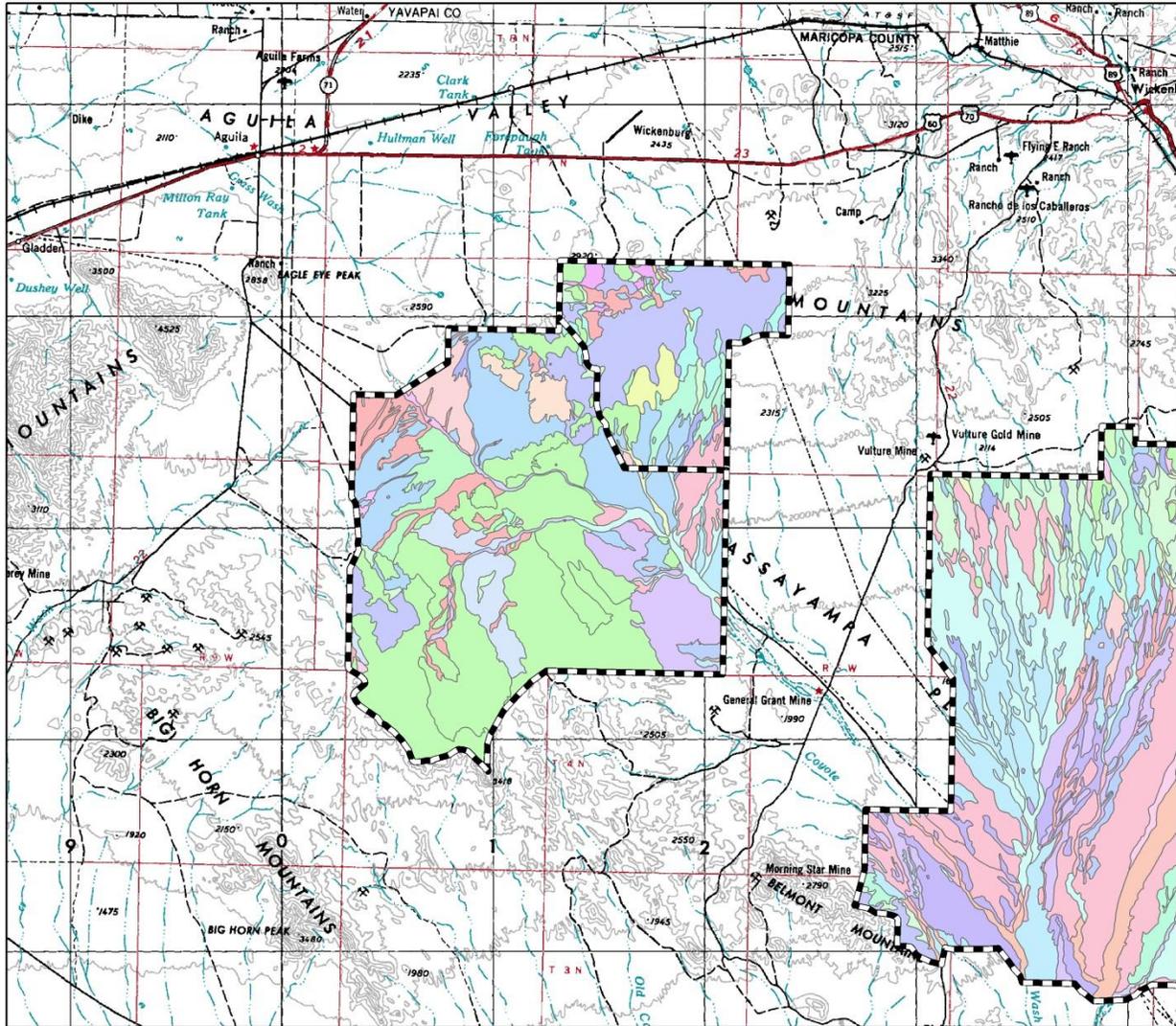
Legend

- Ohaco_Key_Areas
- Ohaco Complex Boundaries
- BLM
- BR
- County
- Indian Lands
- Local or State Parks
- Military
- NPS
- Other
- Private
- State
- State Wildlife Area
- USFS
- USFWS



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Map 3, Ohaco Complex Ecological Sites
 Ohaco Complex Ecological Sites



Legend

ecoclassna

Limy Fan 7-10" p.z.	Limy Upland 10-12" p.z.	Sandy Bottom 3-7" p.z.
Basalt Hills 7-10" p.z.	Limy Upland 2-7" p.z.	Sandy Bottom 7-10" p.z.
Clay Loam Upland 10-12" p.z.	Limy Upland 3-7" p.z. Deep	Sandy Loam 7-10" p.z. Deep
Clay Loam Upland 7-10" p.z.	Limy Upland 7-10" p.z.	Sandy Loam Slopes 7-10" p.z. Limy
Clayey Bottom 7-10" p.z.	Limy Upland 7-10" p.z. Deep	Sandy Loam Upland 3-7" p.z.
Clayey Upland 10-12" p.z.	Loamy Hills 7-10" p.z.	Sandy Loam Upland 7-10" p.z.
Clayey Upland 7-10" p.z.	Loamy Upland 3-7" p.z.	Sandy Upland 3-7" p.z.
Granitic Hills 7-10" p.z.	Loamy Upland 10-12" p.z.	Sandy Upland 7-10" p.z.
Granitic Upland 7-10" p.z.	Loamy Upland 7-10" p.z.	Schist Hills 7-10" p.z.
Limy Fan 2-7" p.z.	Loamy Upland 7-10" p.z. Saline	Shallow Upland 7-10" p.z.
Limy Fan 3-7" p.z.	Saline Upland (Loamy) 2-7" p.z.	Volcanic Hills 7-10" p.z.



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2.0 Key Area Data

2.1 Ohaco Allotment

2.1.1 Key Area 1

This Key Area was abandoned in 1986.

2.1.2 Key Area 2

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	Slight to Moderate Departure. This is due to the slope of the site, the thin nature of the soils, and the slightly clumpy distribution of vegetation.
Hydrologic Function (H):	Slight to Moderate Departure. This is due to the slope of the site, the thin nature of the soils, and the slightly clumpy distribution of vegetation.
Biotic Integrity (B):	Slight to Moderate Departure. This is due to drought effect.

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	Site	Bare Ground	Foliar Cover	Basal Cover	Litter	Gravel (2mm-2")	Rock (>1/2")	Rock (>2")
2013	2	1.5%	15.0%	N/A	12.0%	52.0%	N/A	19.5%
1993	2	29.0%	N/A	4.5%	51.0%	N/A	15.5%	N/A
1988	2	40.5%	N/A	4.5%	22.5%	N/A	32.5%	N/A
1982	2	43.5%	35.5%	N/A	1.5%	N/A	19.5%	N/A

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA2	Symbol	Frequency (%)				Composition (%)
		2013	1993	1988	1982	
Tree and Shrub Species						
Acacia constricta	ACCO2	11.0	9.0	5.0	4.5	22.71
Acacia greggii	ACGR	1.0	3.0	2.0	3.0	2.35
Echinocereus engelmannii	ECEN	-	-	1.0	-	-
Ephedra nevadensis	EPNE	-	2.5	1.0	-	-
Eriogonum wrightii	ERWR	0.5	-	2.0	-	1.18
Gutierrezia sarothrae	GUSA2	2.0	6.0	4.0	2.5	1.53
Krameria erecta	KRER	5.5	6.0	6.0	4.0	11.18
Larrea tridentata	LATR2	12.5	16.0	12.0	8.0	23.18
Lycium pallidum	LYPA	-	0.5	1.0	-	-
Menodora scabra	MESC	-	-	0.5	0.5	-

Opuntia sp.	OPUNT	0.5	4.5	5.5	1.0	1.06
Parkinsonia microphylla	PAMI5	5.0	2.0	3.0	4.5	11.76
Prosopis juliflora	PRJU3	-	1.0	1.0	0.5	-
Psilostrophe cooperi	PSCO2	-	0.5	-	-	-
Salazaria mexicana	SAME	-	0.5	0.5	-	-
Senna	SENN	2.5	-	-	-	4.82
Teucrium canadense	TECAC	-	5.0	5.0	-	-
Ziziphus obtusifolia	ZIOB	1.5	1.0	1.0	1.5	3.41
Grasses and Forbs						
Aristida sp.	ARIST	-	-	1.0	2.0	-
Dasyochloa pulchella	DAPU7	0.5	2.0	2.0	-	1.18
Dichelostemma capitatum	DICAC5	3.5	11.0	12.0	18.5	7.18
Eriogonum inflatum	ERIN4	2.0	0.5	-	-	4.71
Muhlenbergia porteri	MUPO2	-	0.5	0.5	0.5	-
Pleuraphis mutica	PLMU3	2.0	9.0	9.0	14.0	3.76
Sphaeralcea ambigua	SPAM2	-	3.0	3.0	1.5	-
Annuals						
Annual forbs	AAFF	48.5	100	100	100	-
Annual grasses	AAGG	97.0	100	100	100	-

Utilization data:

KA 2 Utilization	Utilization %	
	PLMU2/ HIMU2/ HIRI	KRER
1/2013	30.5%	24.5%
10/93	8.0%	
10/92	6.8%	
1/92	8.0%	
1/91	16.9%	
10/89	16.2%	
1/89	18.6%	
11/87	22.1%	
6/86	30.0%	
6/85	19.6%	
1/83	44.5%	
9/82	31.2	

2.1.3 Key Area 3

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	Slight to Moderate Departure. The departure is due to soil movement on the site in excess of what is expected in the reference state.
Hydrologic Function (H):	Slight to Moderate Departure. The departure is due to soil movement on the site in excess of what is expected in the reference state.
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")
2014	6.0%	26.5%	N/A	23.5%	23.0%	N/A	20.5%
1993	19.5	N/A	9.0	50.0	N/A	21.5	N/A
1988	32.5	N/A	10.5	20.5	N/A	36.5	N/A
1982	42.5	24.0	N/A	5.0%	N/A	28.5	N/A

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA3	Symbol	Frequency (%)				Composition (%)
		2014	1993	1988	1982	
Tree and Shrub Species						
Cylindropuntia acanthocarpa	CYAC8	8.0	15.0	18.0	10.0	5.31
Encelia farinosa	ENFA	23.5	1.0	-	0.5	14.91
Echinocereus engelmannii	ECEN	-	0.5	0.5	0.5	-
Ephedra	EPHED	-	0.5	0.5	-	-
Janusia gracilis	JAGR	0.5	-	-	0.5	0.06
Krameria grayi	KRGR	0.5	-	1.0	0.5	0.57
Larrea tridentata	LATR2	21.5	12.5	16.0	12.0	17.77
Lycium	LYCIU	4.0	2.0	4.5	0.5	1.71
Mammillaria sp.	MAMMI	-	0.5	-	-	
Menodora scabra	MESC	0.5	-	-	-	0.4
Opuntia	OPUNT	5.0	6.0	12.0	6.5	2.63
Parkinsonia microphylla	PAMI5	17.0	9.0	-	3.5	14.29
Prosopis velutina	PRVE	0.5	0.5	1.5	-	0.17
Stephanomeria	STEPH	1.5	-	-	0.5	0.34
Grasses and Forbs						
Dasyochloa pulchella	DAPU7	-	21.0	14.0	28.5	-
Dichelostemma capitatum	DICAC5	44.5	-	-	-	20.34

Marina parryi	MAPA7	0.5	-	-	-	0.06
Muhlenbergia porteri	MUPO2	-	0.5	-	-	-
Pleuraphis mutica	PLMU2	25.5	43.5	45.0	28.0	20.46
Sphaeralcea ambigua	SPAM2	2.5	-	2.5	1.0	0.97
Annuals						
Annual forbs	AAFF	88.5	100	100	100	-
Annual grasses	AAGG	19.5	100	100	100	-

Utilization data:

KA 3 Utilization	Utilization %
Year	PLMU2/HIMU2 /HIRI
3/2014	7.1%
10/93	5.0%
10/92	8.0%
1/92	4.6%
1/91	5.3%
10/89	21.1%
1/89	19.7%
6/86	31%
6/85	6.2%
1/83	21.2%
9/82	14.2%

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	Site	Bare Ground	Herb. Cover	Litter	Gravel	Rock
2005	4	1%	22%	29%	46%	2%

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA4	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species		2005	2005
Acacia constricta	ACCO2	4.0	3.16
Ambrosia deltoidea	AMDE4	9.0	7.25
Ambrosia dumosa	AMDU2	1.5	2.48
Cylindropuntia acanthocarpa	CYAC8	0.5	0.62
Dalea sp.	DALEA	2.0	1.67
Encelia farinosa	ENFA	4.0	2.73
Ephedra	EPHED	1.0	0.68
Eriogonum fasciculatum	ERFA2	1.5	1.67
Fouquieria splendens	FOSP2	0.5	0.56
Gutierrezia sarothrae	GUSA2	3.0	1.61
Janusia gracilis	JAGR	0.5	0.06
Krameria erecta	KRER	7.5	9.85
Larrea tridentata	LATR2	14.5	10.78
Lycium	LYCIU	2.5	2.79
Menodora scabra	MESC	0.5	0.12
Parkinsonia microphylla	PAMI5	15.0	11.15
Psilostrophe cooperi	PSCO2	4.0	2.29
Viguiera dentata	VIDE3	0.5	0.43
Grasses and Forbs			
Aristida sp.	ARIST	2.0	1.98
Argythamnia neomexicana	ARNE2	0.5	0.62
Euphorbia sp.	EUPHO	4.5	4.34
Mirabilis laevis	MILAV	0.5	0.56
Pleuraphis mutica	PLMU2	0.5	0.43
Senna covesii	SECO10	30.0	31.10
Unknown forb	UNK	1.0	1.05

Utilization data:

KA 4 Utilization	Utilization %
Year	PLMU2/HIMU2 /HIRI
1/2015	10.9%

2.1.5 Key Area 5

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	Site	Bare Ground	Herb. Cover	Litter	Gravel	Rock	Cryptogam
2005	5	10.9%	13.4%	36.4%	35.4%	1.8%	2.1%

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA5	Symbol	Frequency (%)	Composition (%)
		2005	2005
Tree and Shrub Species			
Acacia constricta	ACCO2	1.5	1.25
Fouquieria splendens	FOSP2	0.5	0.60
Krameria erecta	KRER	5.5	5.60
Larrea tridentata	LATR2	34.5	35.48
Lycium	LYCIU	3.0	1.31
Parkinsonia microphylla	PAMI5	1.5	1.61
Grasses and Forbs			
Aristida sp.	ARIST	2.0	0.89
Argythamnia neomexicana	ARNE2	1.5	1.31
Dasyochloa pulchella	DAPU7	8.5	8.99
Euphorbia sp.	EUPHO	38	40.5
Senna covesii	SECO10	0.5	0.60
Sphaeralcea ambigua	SPAM2	1.5	1.43

Utilization data:

KA 5 Utilization	
Year	Utilization %
1/2015	17%

2.1.6 Key Area 6

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	Site	Bare Ground	Herb. Cover	Litter	Gravel	Rock
2005	6	17.3%	26.4%	20.0%	33.6%	2.7%

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA6	Symbol	2005	2005
Tree and Shrub Species			
Acacia constricta	ACCO2	2.5	1.79
Ambrosia dumosa	AMDU2	17.0	11.52
Dalea sp.	DALEA	1.0	0.70
Ephedra sp.	EPHED	1.0	0.40
Fouquieria splendens	FOSP2	0.5	0.35
Krameria erecta	KRER	5.5	3.94
Larrea tridentata	LATR2	21.0	14.56
Lycium	LYCIU	0.5	0.50
Mirabilis laevis	MILAV	3.0	2.14
Parkinsonia microphylla	PAMI5	21.5	15.35
Psilostrophe cooperi	PSCO2	1.0	0.45
Salazaria mexicana	SAME	1.0	0.45
Stephanomeria pauciflora	STPA4	0.5	0.45
Viguiera	VIGUI	0.5	0.35
Grasses and Forbs			
Aristida sp.	ARIST	18.5	10.52
Argythamnia neomexicana	ARNE2	2.0	1.05
Dasyochloa pulchella	DAPU7	11.0	9.72
Eriogonum inflatum	ERIN4	0.5	0.50
Euphorbia sp.	EUPHO	32.5	24.13
Muhlenbergia porteri	MUPO2	0.5	0.10
Pleuraphis rigida	PLRI3	0.5	0.35
Sphaeralcea ambigua	SPAM2	1.0	0.80

Utilization data:

KA 6 Utilization	
	Utilization %

Year	ARIST
1/2015	3%

2.1.7 Key Area 7

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	Site	Bare Ground	Foliar Cover	Basal Veg	Litter	Gravel	Cryptogam
2015	7	7.9%	21.8%	0.9%	56.4%	30.2%	4.4%

Frequency and Composition Data:

Composition data is based on Belt Density.

Plant Species KA7	Symbol	Composition (%)
Tree and Shrub Species		
		2014
Acacia constricta	ACCO2	1.8
Ambrosia dumosa	AMDU2	1.2
Krameria erecta	KRER	1.2
Larrea tridentata	LATR2	27.9
Lycium	LYCIU	2.4
Parkinsonia microphylla	PAMI5	3.0
Psilostrophe cooperi	PSCO2	0.6
Tiquilia canescens	TICA3	0.6
Grasses and Forbs		
Aristida sp.	ARIST	3.0
Argythamnia neomexicana	ARNE2	6.7
Dasyochloa pulchella	DAPU7	53.9
Euphorbia sp.	EUPHO	0.6
Sphaeralcea ambigua	SPAM2	0.6

Utilization data:

KA 7 Utilization	
	Utilization %
Year	KRER

1/2015	7.6%
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2.1.8 Key Area 8

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	Site	Bare Ground	Foliar Cover	Basal Veg	Litter	Gravel	Rock	Cryptogam
2015	8	20%	72%	17%	44%	10%	6%	3%

Frequency and Composition Data:

Composition data is based on Dry Weight Rank.

Plant Species KA8	Symbol	Frequency (%)	Composition (%)
		2015	2015
Tree and Shrub Species			
Acacia greggii	ACGR	28	12.27
Ambrosia confertifolia	AMCO3	8	5.26
Ambrosia deltoidea	AMDE4	11	3.81
Ambrosia dumosa	AMDU2	1	0.72
Hymenoclea salsola	HYSA	10	5.57
Larrea tridentata	LATR2	17	8.66
Lycium	LYCIU	10	4.43
Olneya tesota	OLTE	1	0.1
Parkinsonia florida	PAFL6	34	24.33
Phoradendron californicum	PHCA	2	0.82
Prosopis velutina	PRVE	32	23.50
Grasses and Forbs			
Aristida sp.	ARIST	4	2.06
Aristolochia watsonii	ARWA	4	2.27
Delphinium parishii	DEPA	1	0.21
Euphorbia sp.	EUPHO	3	1.96
Funastrum cynanchoides	FUCY	7	2.47
Nicotiana obtusifolia	NIOB	1	0.31
Senna covesii	SECO10	1	0.21
Sphaeralcea ambigua	SPAM2	2	0.62

Annual Forbs	AAFF	11	0.41
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Utilization data:

KA 8 Utilization	
	Utilization %
Year	ARIST
1/2015	27%

2.2 Effus 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	Gravel	Herb. Canopy	Litter	Rock	Live Basal Veg.
2013	3.5%	10.0%	21.5%	33.5%	24.0%	7.0%
1989	48.5%	N/A	N/A	9.5%	39.5%	2.5%
1985	33.5%	N/A	N/A	8.5%	46.5%	11.5%
1983	32.5%	N/A	N/A	7.5%	47.0%	13.0%

Frequency and Composition Data:

Composition data is taken from dry weight rank.

Plant Species KA1 2013	Symbol	Frequency (%)				Composition (%)
Tree and Shrub Species		2013	1989	1985	1983	2013
Acacia constricta	ACCO	-	0.5	-	-	-
Acacia gregii	ACGR	2.5	0.5	3.0	2.5	1.47
Ambrosia deltoidea	AMDE4	8.5	2.5	5.5	5.0	8.08
Castela emoryi	CAEM4	3.5	0.5	3.0	2.5	2.05
Dyssodia prophyllodes	DYPO	0.5	1.5	-	-	.64
Echinocereus engelmannii	ECEN	1.0	0.5	-	0.5	.51
Encelia frutescens	ENFR	-	-	2.5	0.5	-
Ephedra	EPHED	2.0	1.5	1.0	1.0	.9
Eriogonum fasciculatum	ERFA2	19.0	30.0	30.0	31.0	17.69

Fouquieria splendens	FOSP2	1.0	-	1.0	0.5	.71
Janusia gracilis	JAGR	6.0	-	1.0	0.5	4.74
Krameria erecta	KRER	3.50	3.0	-	-	2.37
Larrea tridentata	LATR2	-	-	1.0	0.5	-
Lycium andersonii	LYAN	.50	-	-	-	.45
Menodora scabra	MESC	16.5	5.5	1.0	0.5	12.44
Opuntia sp.	OPUNT	1.0	1.0	2.0	0.5	.83
Parkinsonia microphylla	PAMI5	6.0	0.5	3.5	2.0	4.74
Stephanomeria pauciflora	STPA4	-	-	1.5	1.0	-
Viguiera dentata	VIDE3	3.50	-	-	-	1.73
Grasses and Forbs						
Aristida	ARIST	6.5	4.0	1.0	-	4.29
Argythamnia neomexicana	ARNE2	.5	-	-	-	.64
Dasyochloa pulchella	DAPU7	-	1.0	0.5	0.5	-
Eriogonum	ERIOG	2	-	-	-	.9
Muhlenbergia porteri	MUPO2	-	0.5	-	-	-
Pleuraphis mutica	PLMU3	32.50	-	-	-	35.58
Pleuraphis rigida	PLRI3	-	28.5	42.5	39.5	-
Sphaeralcea ambigua	SPAM2	-	1.0	-	-	-
Tridens muticus	TRMU	.5	-	-	-	.06

Utilization Data:

KA 1 Utilization Year	Utilization %	
	PLMU2/HIMU2 /HIRI	MESC
1/2015	43%	
5/2013	43%	55%
9/92	0%	
8/91	0%	
12/90	13.75%	
11/88	17.7%	Moderate/Heavy
11/86	17.9%	

2.2.2 Key Area 2

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. This attribute borders on the Slight to Moderate departure due to the steepness of the slope on the site increasing the probability of erosion.
Hydrologic Function (H):	Slight to Moderate Departure. The departure is due to the steepness of the site in comparison to the reference state.
Biotic Integrity (B):	Slight to Moderate Departure. The departure is mainly due to drought effects exacerbated by frequent grazing due to proximity to water sources.

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	Gravel (2mm-2")	Rock (>1/2")	Rock (>2")	Basal Veg	Litter	Cryptogam	Canopy
2015	4.4%	27.2%	N/A	17.0%	5.8%	45.6%	0%	29%
1985	38.0%	N/A	55.0%	N/A	4.5%	3.0%	N/A	N/A
1983	34.0	N/A	58.5	N/A	7.0%	0.5%	N/A	N/A

Composition Data:

Composition data is taken from dry weight rank.

KA2 Plant Species	Symbol	Frequency (%)			Composition (%)
		2015	1985	1983	2015
Tree and Shrub Species					
Acacia constricta	ACCO2	4.8	-	-	4.74
Acacia gregii	ACGR	1.4	6.0	4.5	0.78
Ambrosia deltoidea	AMDE4	0.5	-	-	0.06
Dyssodia porophylloides	DYPO	4.8	1.0	2.0	1.17
Echinocereus engelmannii	ECEN	0.5	1.5	2.5	0.06
Encelia farinosa	ENFA	5.3	1.0	1.0	3.96
Encelia frutescens	ENFR	2.9	0.5	0.5	1.75
Ephedra	EPHED	1.0	1.0	1.5	0.52
Eriogonum fasciculatum	ERFA2	22.3	36.0	34.0	15.39
Fouquieria splendens	FOSP2	2.9	5.5	6.0	2.79
Janusia gracilis	JAGR	9.2	-	-	6.75
Krameria erecta	KRER	6.8	3.0	3.5	4.87
Larrea tridentata	LATR2	1.9	-	-	2.34
Menodora scabra	MESC	6.8	-	-	4.02
Opuntia sp.	OPUNT	0.5	2.0	2.5	0.12
Parkinsonia microphylla	PAMI5	19.9	15.0	7.0	18.77
Phoradendron californicum	PHCA8	0.5	-	-	0.45
Psilostrophe cooperi	PSCO2	1.0	1.0	0.5	1.3
Ziziphus obtusifolia	ZIOB	-	0.5	0.5	-
Grasses and Forbs					
Aristida	ARIST	-	0.5	1.0	-
Argythamnia neomexicana	ARNE2	2.9	-	-	1.62
Dasyochloa pulchella	DAPU7	21.4	-	1.0	22.21
Euphorbia	EUPHO	4.4	-	-	2.4
Pellaea truncata	PETR3	1.0	-	-	0.71
Pleuraphis mutica	PLMU3	3.4	-	-	3.18
Pleuraphis rigida	PLRI3	-	25.5	24.5	-

Annuals					
Annual Forbs	AAFF	16.6	-	-	-
Annual Grasses	AAGG	85.4	-	-	-

Utilization Data:

KA 2 Utilization	Utilization %	
Year	PLMU2/HIMU2 /HIRI	ERFA2
9/2015	55.4%	27.0%
9/92	0%	
8/91	0%	
12/90	1%	Slight/Light
11/88	1%	
11/86	23.5%	

2.3 Douglas Allotment

2.3.1 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:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	Site	Bare Ground	Herb. Cover	Litter	Gravel	Rock	Cryptogams
2013	1	24%	8%	46%	8%	2%	12%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

KA1 2013 Plant Species	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
Acacia greggii	ACGR	8.0	8.31
Ambrosia ambrosioides	AMAM2	6.0	4.42
Ambrosia deltoidea	AMDE4	9.0	7.53
Beloperone californica	BECA7	26.0	22.08
Hymenoclea salsola	HYSA	6.0	4.16
Larrea tridentata	LATR2	30.0	30.91
Lycium	LYCUI	11.0	6.62
Olneya tesota	OLTE	8.0	10.0
Parkinsonia florida	PAFL6	5.0	4.03
Parkinsonia microphylla	PAMI5	3.0	1.56
Trixis	TRIXI	1.0	0.39

3.0 Ohaco 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	<i>Acacia constricta</i>	ACCO2		X	
Catclaw Acacia	<i>Acacia greggii</i>	ACGR	X	X	
Weakleaf bursage	<i>Ambrosia confertifolia</i>	AMCO3		X	
Triangle leaf bursage	<i>Ambrosia deltoidea</i>	AMDE4	X	X	
White bursage	<i>Ambrosia dumosa</i>	AMDU2	X	X	
N/A	Annual forbs	AAFF	X	X	X
N/A	Annual grasses	AAGG	X	X	X
New Mexico silverbush	<i>Argythamnia neomexicana</i>	ARNE2		X	X
Three-awn	<i>Aristida</i> sp.	ARIST	X		X
Watson’s dutchman’s pipe	<i>Aristolochia watsonii</i>	ARWA			
Beloperone	<i>Beloperone californica</i>	BECA7			X
Crucifixion thorn	<i>Castela emoryi</i>	CAEM4			
Buckhorn cholla	<i>Cylindropuntia acanthocarpa</i>	CYAC8	X		
Prairie clover	<i>Dalea</i> sp.	DALEA			
Fluffgrass	<i>Dasyochloa pulchella</i>	DAPU7	X		X
Desert larkspur	<i>Delphinium parishii</i>	DEPA			
Bluedicks	<i>Dichelostemma capitatum</i>	DICAC5			
Slender poreleaf	<i>Dyssodia porophylloides</i>	DYPO			X
Engelmann’s hedgehog	<i>Echinocereus engelmannii</i>	ECEN			
Brittlebush	<i>Encelia farinosa</i>	ENFA	X	X	
Button brittlebush	<i>Encelia frutescens</i>	ENFR			
Mormon tea	<i>Ephedra</i>	EPHED	X		X
Mormon tea	<i>Ephedra nevadensis</i>	EPNE	X		X
Buckwheat	<i>Eriogonum</i>	ERIOG		X	
Flat-top buckwheat	<i>Eriogonum fasciculatum</i>	ERFA2	X	X	X

Desert Trumpet	<i>Eriogonum inflatum</i>	ERIN4	X	X	X
Shrubby buckwheat	<i>Eriogonum wrightii</i>	ERWR	X	X	X
Spurge	<i>Euphorbia</i> sp.	EUPHO	X		
Ocotillo	<i>Fouquieria splendens</i>	FOSP2			
Fringed twinevine	<i>Funastrum cynanchoides</i>	FUCY			
Snakeweed	<i>Gutierrezia sarothrae</i>	GUSA2			
Burrobrush	<i>Hymenoclea salsola</i>	HYSA			X
Slender janusia	<i>Janusia gracilis</i>	JAGR	X	X	X
Range ratany	<i>Krameria erecta</i>	KRER	X	X	X
White ratany	<i>Krameria grayi</i>	KRGR	X	X	X
Creosote bush	<i>Larrea tridentata</i>	LATR2	X	X	
Wolfberry	<i>Lycium</i>	LYCIU	X	X	
Anderson's wolfberry	<i>Lycium andersonii</i>	LYAN	X	X	X
Pale desert-thorn	<i>Lycium pallidum</i>	LYPA		X	X
Fishhook pincushion	<i>Mammillaria</i> sp.	MAMMI	X		
Parry's false prairie-clover	<i>Marina parryi</i>	MAPA7	X		
Rough menodora	<i>Menodora scabra</i>	MESC		X	X
Wishbone-bush	<i>Mirabilis laevis</i>	MILAV	X		
Bush muhly	<i>Muhlenbergia porteri</i>	MUPO2	X		X
Desert tobacco	<i>Nicotiana obtusifolia</i>	NIOB			
Desert Ironwood	<i>Olneya tesota</i>	OLTE	X	X	X
Prickly pear	<i>Opuntia</i>	OPUNT	X	X	X
Blue palo verde	<i>Parkinsonia florida</i>	PAFL6		X	
Little leaf palo verde	<i>Parkinsonia microphylla</i>	PAMI5	X	X	X
Spiny cliffbrake	<i>Pellaea truncata</i>	PETR3	X		
Mesquite mistletoe	<i>Phoradendron californicum</i>	PHCA8		X	
Tobosagrass	<i>Pleuraphis mutica</i>	PLMU3	X		X
Big galleta	<i>Pleuraphis rigida</i>	PLRI3	X		X
Mesquite	<i>Prosopis juliflora</i>	PRJU3	X	X	X
Velvet mesquite	<i>Prosopis velutina</i>	PRVE	X	X	X
Whitestem paperflower	<i>Psilostrophe cooperi</i>	PSCO2	X		
Mexican bladdersage	<i>Salazaria mexicana</i>	SAME		X	
Cassia	<i>Senna</i>	SENN			
Rattlesnake bush	<i>Senna covesii</i>	SECO10			
Globemallow	<i>Sphaeralcea ambigua</i>	SPAM2	X	X	X
Wirelettuce	<i>Stephanomeria</i>	STEPH			
Brownplume wirelettuce	<i>Stephanomeria pauciflora</i>	STPA4			

Canada germander	Teucrium canadense	TECAC			
Rat-ear coldenia	Tiquilia canescens	TICA3	X		
Slim tridens	Tridens muticus	TRMU	X		X
Trixis	Trixis sp.	TRIXI		X	X
N/A	Unknown forb	UNK			
Goldeneye	Viguiera	VIGUI	X	X	
Toothleaf goldeneye	Viguiera dentata	VIDE3		X	
Graythorn	Ziziphus obtusifolia	ZIOB			

4.0 Ohaco Complex Soils List

Highlighted soils are described in detail in section 2.2.4 of the Ohaco Complex RHE.

Soil Name	Allotment Percentage		
	Ohaco	Effus	Douglas
Antho-Carrizo-Maripo complex	0.2	0.8	2.1
Antho-Carrizo-Maripo complex, low precipitation	1.3	0.6	0.1
Anthony sandy loam	0.3	N/A	N/A
Brios-Carrizo complex, 1 to 5 percent slopes	1.1	N/A	N/A
Brios-Carrizo complex, low precipitation, 1 to 5 percent slopes	0.1	N/A	12.2
Carefree-Beardsley complex	T	0.5	N/A
Carrizo very gravelly sand	N/A	N/A	0.3
Cherioni-Rock outcrop complex, 5 to 60 percent slopes	2.5	N/A	N/A
Chuckwall-Gunsight complex, low precipitation, 1 to 8 percent slopes	N/A	N/A	3.2
Cipriano very gravelly loam	3.3	5.5	N/A
Continental-Mohave complex, 1 to 4 percent slopes	3.2	N/A	N/A
Continental-Ohaco complex	N/A	0.3	N/A
Denure-Momoli-Carrizo complex	T	1.6	T
Denure-Momoli-Carrizo complex, low precipitation	0.8	N/A	1.9
Eba-Continental complex, 1 to 8 percent slopes	0.2	0.3	N/A
Eba-Pinaleno complex, low precipitation, 3 to 20 percent slopes	0.2	3.5	N/A
Eba-Pinaleno complex, low precipitation, 20 to 40 percent slopes	N/A	0.2	N/A
Eba very gravelly loam, low precipitation, 8 to 20 percent slopes	N/A	T	N/A
Ebon-Contine complex, 1 to 8 percent slopes	0.1	N/A	N/A
Ebon-Gunsight-Cipriano association, 3 to 25 percent slopes	0.4	0.1	2.4
Ebon-Pinamt complex, 3 to 20 percent slopes	N/A	1.3	13.5
Ebon-Pinamt complex, 20 to 40 percent slopes	T	N/A	T
Gachado-Lomitas-Rock outcrop complex, 7 to 55 percent slopes	24	N/A	0.1
Gachado-Lomitas complex, 8 to 25 percent slopes	18.2	N/A	N/A
Gadsden clay	T	N/A	N/A
Gilman loams	N/A	N/A	T
Gran-Wickenburg-Rock outcrop complex, low precipitation, 10 to 65 percent slopes	2.6	45.9	N/A
Gran-Wickenburg complex, low precipitation, 1 to 10 percent slopes	0.2	9.6	N/A
Greyeagle-Continental-Nickel association, 1 to 40 percent slopes	11.3	T	N/A
Greyeagle-Suncity variant complex, 1 to 7 percent slopes	3	0.4	N/A
Guest clay	0.4	N/A	N/A
Gunsight-Cipriano complex, low precipitation, 1 to 7 percent slopes	6.2	N/A	T
Gunsight-Rillito complex, 1 to 25 percent slopes	T	2.9	N/A
Gunsight-Rillito complex, low precipitation, 1 to 40 percent slopes	1.8	0.7	28.5
Lehmans-Rock outcrop complex, low precipitation, 8 to 65 percent slopes	1.7	5.2	N/A
Luke-Cipriano association, 1 to 15 percent slopes	N/A	N/A	T
Mohall-Tremant complex, low precipitation, 1 to 8 percent slopes	T	N/A	T

Mohall loam, calcareous solum	N/A	N/A	0.1
Mohave-Guest complex	1.3	T	N/A
Mohave clay loam	T	0.4	N/A
Mohave complex	1.2	N/A	N/A
Mohave loam, calcareous solum	N/A	T	N/A
Momoli-Carrizo complex	T	8.4	0.4
Momoli-Carrizo complex, low precipitation	N/A	N/A	7
Nickel-Cave complex, low precipitation, 8 to 30 percent slopes	N/A	7.3	N/A
Ohaco gravelly loam	0.1	N/A	N/A
Pinaleno-Tres Hermanos complex, low precipitation, 1 to 10 percent slopes	T	0.5	N/A
Pinamt-Tremant complex, 1 to 10 percent slopes	0.6	2.6	3.1
Pinamt-Tremant complex, low precipitation, 1 to 10 percent slopes	N/A	0.4	2.1
Quilotosa-Vaiva-Rock outcrop complex, 20 to 65 percent slopes	2.6	N/A	11.8
Rillito gravelly loam, 1 to 8 percent slopes	N/A	N/A	T
Rock outcrop- Gachado complex, 5 to 55 percent slopes	0.1	N/A	N/A
Schenco-Tock outcrop complex, 3 to 25 percent slopes	N/A	N/A	0.9
Suncity-Cipriano complex, 1 to 7 percent slopes	0.7	0.8	3.4
Tremant-Gunsight-Rillito complex, 1 to 5 percent slopes	3.1	0.2	N/A
Tremant-Gunsight-Rillito complex, low precipitation, 1 to 5 percent slopes	1.4	N/A	4.5
Tremant-Suncity complex, 1 to 8 percent slopes	0.1	N/A	0.2
Tremant gravelly loams	N/A	N/A	1.9
Vaiva very gravelly loam, 1 to 20 percent slopes	5.2	N/A	N/A
Water	T	N/A	N/A

*T- Trace soils present at less than 0.1% of the soil series present on Public Lands

*N/A- Soil not present on public lands within the allotment.

5.0 Ohaco Complex Ecological Sites

Ecological Site	Allotment Percent		
	Ohaco	Effus	Douglas
Unassigned/Rock Outcrop	0.1	-	3.2
Basalt Hills 7-10"	0.5	-	-
Clay Loam Upland 7-10"	0.7	2.6	16
Clayey Bottom 7-10"	0.4	-	-
Clayey Upland 7-10"	3.3	0.5	-
Clayey Upland 10-12"	-	0.3	-
Granitic Hills 7-10"	5.1	45.9	11.8
Granitic Upland 7-10"	5.2	-	-
Limy Fan 3-7"	0.1	-	0.2
Limy Fan 7-10"	-	T	2.0
Limy Upland 3-7"	6.2	-	T
Limy Upland 7-10"	15.3	9.2	3.4
Limy Upland 10-12"	3.0	0.4	-
Limy Upland Deep 3-7"	2.4	1.1	37.6
Limy Upland Deep 7-10"	0.2	11	3.5
Loamy Hills 7-10"	T	0.2	T
Loamy Upland 3-7"	1.4	-	4.5
Loamy Upland 7-10"	5.8	3.8	-
Loamy Upland 10-12"	0.1	-	-
Sandy Wash 3-7"	0.1	-	12.2
Sandy Wash 7-10"	1.1	-	-
Sandy Loam Deep 7-10"	0.4	1.6	T
Sandy Loam Slopes 7-10" Limy	-	7.3	-
Sandy Loam Upland 3-7"	2.1	0.6	2.0
Sandy Loam Upland 7-10"	0.2	0.8	2.1
Sandy Upland 3-7"	-	-	0.3
Schist Hills 7-10"	-	-	0.9
Shallow Upland 7-10"	0.2	9.5	-
Volcanic Hills 7-10"	43.9	5.2	0.1