United States Department of the Interior
Bureau of Land Management
Lower Sonoran Field Office

Land Health Evaluation

Ajo/Sentinel Complex

Cameron (#03013)
Childs (#03016)
Coyote Flat #2 (#00106)
Sentinel (#03076)

Table of Contents

Abstract
This Land Health Evaluation is a stand-alone report designed to ascertain compliance with the Arizona Standards for Rangeland Health on the Childs, Cameron, Coyote Flat #2, and Sentinel allotments. Standard 1 is achieved on all but the Limy Upland Deep and Limy Fan of the Childs and the Sandy Wash ecological sites of the Coyote Flat #2 and Sentinel allotments. Standard Two is not applicable to this complex of allotments. Standard 3 is achieved on all but Sandy Loam Deep and Limy Fan ecological sites on the Childs allotment and the Limy Fan ecological site of the Coyote Flat #2 allotment.

1.0 Introduction:
The purpose of this land health evaluation is to determine whether the Arizona Standards of Rangeland Health (Standards) are being achieved on the Ajo/Sentinel Complex Allotments (Cameron, Childs, Coyote Flat #2, and Sentinel allotments) and to determine if livestock are the causal factor for either not achieving or not making significant progress towards achieving land health standards. This evaluation is not a decision document, but a standalone report that 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. The DPC objectives will assure that soil condition and ecosystem function described in Standards 1, 2 and 3 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.

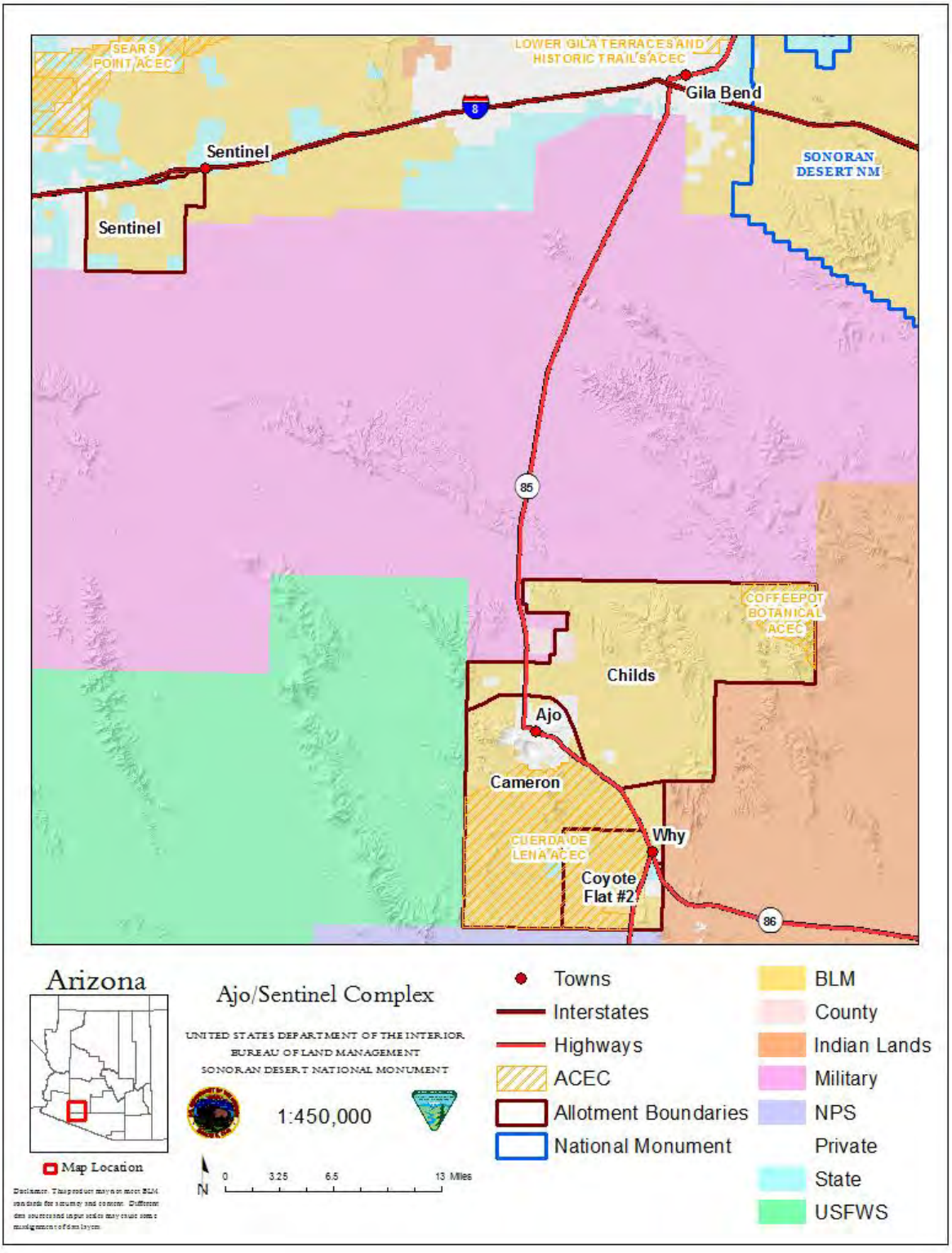
Land Health Standards are measurable and attainable goals for the desired condition of the biological resources and physical components/characteristics of the desert ecosystems found within the boundaries of these grazing allotments.

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

2.0 Complex Profile

2.1 Complex Location
The Ajo/Sentinel Complex (Map 1) is located about 87 miles southwest of Phoenix, AZ. The complex is based around the city of Ajo and Sentinel, AZ expanding up to approximately 20 miles northwest and 12 miles south of the Ajo city limits and approximately 6 miles south of Sentinel, AZ. The Ajo portion of the Complex is surrounded by a mixture of federal and tribal lands with the Barry M. Goldwater Range (BMGR) to the north, the Tohono O'odham Indian Reservation to the east, the Organ Pipe Cactus National Monument to the south, and the Cabeza Prieta National Wildlife Refuge to the west and is roughly bisected by Interstate 85, which runs north and south/southeast through Ajo, AZ and extends to the United States-Mexico border. The Sentinel

portion is bound by Interstate-8 to the north, BMGR to the south and east, and private farmland to the west.



Map 1: Ajo/Sentinel Complex Allotments

2.2 Physical Description

2.2.1 Allotment Acreages

The acreages of the Complex allotments are listed in Table 1.

Table 1: Allotment Acreages

Land Classification	Cameron	Childs	Coyote Flat #2	Sentinel	Complex Totals
BLM Acres	57,934	98,845	20,419	18,537	195,731
State Acres	670	1,190	721	2,885	5,466
Other Federal Acres	0	0	0	0	0
Private Land Acres	8,568	2,844	865	363	12,640
Total Acres	67,172	102,879	22,005	21,785	213,841

2.2.2 Climate Data

Climate data for this complex 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) weather stations located near Ajo and Sentinel, AZ. Climate data was collected at this site between the years 1914 and 2016. Average mean air temperature at this site is 71.66°F, with an average daily maximum temperature of 83.9°F and an average daily minimum temperature of 59.0°F. This is consistent with the Natural Resource Conservation Service (NRCS) Agricultural Handbook 296, which describes the climate of the area as:

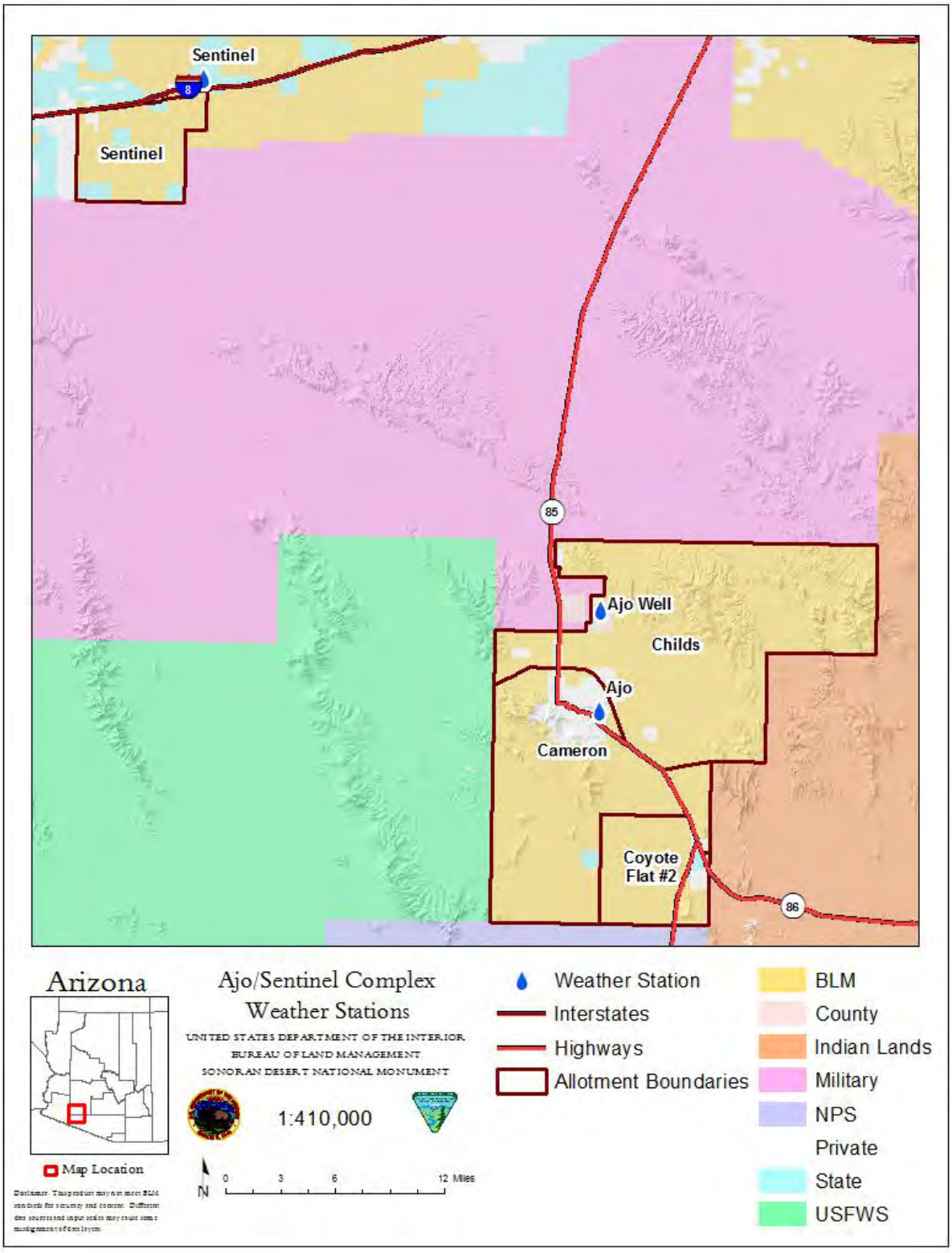
> *"The average annual air temperature is 58 to 74 degrees F (15 to 23 degrees C). The freeze-free period averages 285 days and ranges from 205 to 365 days, decreasing in length with increasing elevation."* (USDA 2006)

2.2.3 Precipitation

Precipitation data for the Ajo/Sentinel Complex is taken from the Western Regional Climate Center. The data are based on three National Oceanic and Atmospheric Administration (NOAA) located in near the Complex (Table 2). Only the stations in the area with 10 or more years of precipitation data available were used (Map 2). The stations below were used in the calculation of precipitation on the Complex:

Table 2: NOAA rain gauge stations.

Station Name	Station Number	Elevation	Years of Record	Mean Annual Rainfall
Ajo	020080	1790	104	8.37
Ajo Well	020088	1400	35	7.84
Sentinel	027751	690	61	4.63



Map 2: Ajo/Sentinel Complex Rain Gauges

2.2.4 Soils Data

The soils of the Ajo/Sentinel Complex were determined using two soil maps produced by NRCS: the 1997 Soil Survey of Gila Bend-Ajo Area, Arizona, Parts of Maricopa and Pima Counties and the 1977 Soil Survey of Maricopa County, Arizona. Field truthing was used in conjunction with the NRCS soil surveys to confirm the soils of the complex. Descriptions and quantifications of soil features and systematics can be found in the 1993 Soil Conservation Service Soil Survey Manual (Soil Survey Division Staff 1993).

Soils in this area have a hyperthermic soil temperature regime and a typic aridic soil moisture regime and are often described as complexes due to the intimate intermingling of soil types. Many of the soils in this area are formed in alluvium and derived from mixed rocks with a strong lime component. Each soil is described as a "map unit" in the NRCS soil surveys. The following soils/map units make up 93% of the complex and correspond with specific ecological sites.

Map Units:
Gunsight-Rillito-Carrizo, 1-15% slope
Gunsight-Chuckawalla, 1- 15% slope
Gunsight-Cipriano, 1-15% slope
Momoli-Comobabi, 5-15% slope
Carrizo-Dateland, 0-3% slope

Gunsight soils consist of deep, well-drained soils formed in mixed alluvium on old alluvial fans. Underlying material contains many soft lime masses and semi-rounded lime concretions. The soil is also moderately alkaline.

The Gunsight-Rillito-Carrizo, 1 to 15 percent slopes map unit occurs on fan terraces that are dissected by narrow flood plains. This unit is about 45 percent Gunsight soil, 35 percent Rillito soil, and 15 percent Carrizo soil. The Gunsight soil occurs on nearly level summits and the gently sloping to strongly sloping sides of fan terraces. The Rillito soil occurs on the nearly level summits of fan terraces. Both soils are deep, somewhat excessively drained, and formed from alluvium derived from mixed rocks. The Gunsight soil typically has 60 to 80 percent of the surface covered with pebbles. The Rillito soil typically has 50 to 75 percent of the surface covered with pebbles. The Carrizo soil occurs on level flood plains. It is deep, excessively drained, and formed in recent alluvium derived from mixed rocks. The Carrizo soil typically has 40 to 80 percent of the surface covered with pebbles and cobbles.

The Gunsight-Chuckawalla complex, 1 to 15 percent slopes map unit is on fan terraces also dissected by washes and is about 40 percent Gunsight soil and 35 percent Chuckawalla soil. The Chuckawalla soil is on nearly level and gently sloping summits of fan terraces, deep, well drained, and is formed from alluvium derived dominantly from mixed rocks. Chuckawalla soil typically has 85 to 100 percent of the surface covered by darkly varnished, closely packed pebbles called desert pavement.

The Gunsight-Cipriano complex, 1 to 15 percent slopes map unit is on fan terraces dissected by washes. This unit is about 50 percent Gunsight soil and 25 percent Cipriano soil. The Cipriano soil is on nearly level and gently sloping summits of fan terraces and is a very shallow

excessively drained soil formed in alluvium. Typically, 50 to 90 percent of the surface is covered with pebbles.

The Momoli-Comobabi association, 5 to 15 percent slopes map unit is on fan terraces flanking granitic mountains. This map unit is about 50 percent Momoli soil and 25 percent Comobabi soil. Small areas of mixed soils may make up to 25 percent of this map unit; Gunsight and Pinamt in the higher parts of the fan terraces, Cipriano soils in the lower parts of fan terraces, Quilotosa and Vaiva soils at the foot of mountains, and Carrizo soils on flood plains. The Momoli soil is deep and excessively drained and typically has between 50 and 85 percent pebble or cobble surface cover. It is formed from alluvium or colluvium derived from granite and gneiss. The Comobabi soil is shallow and well drained and typically has a 50 to 90 percent cobble or pebble surface cover. It is formed in alluvium derived from granite and gneiss.

The Carrizo-Dateland complex, 0 to 3 percent slopes map unit occurs on fan terraces and flood plains. This map unit is 45 percent Carrizo, bench, soil, 20 percent Dateland soil, and 20 percent Carrizo soil. Up to 15 percent of this map unit may include Momoli soils in stream terraces, Denure soils in swales on fan terraces, and Why and Cuerda soils on flood plains. The Carrizo, bench, soil is deep and excessively drained, formed in recent alluvium derived from mixed rock, and occurs on level fan terraces. Pebbles and some rock cover between 45 to 85 percent of the soil surface. The Dateland soil is deep and well drained, formed in alluvium derived from mixed rock, and occurs on nearly level fan terraces between gravel bars. Pebbles typically cover between 1 to 15 percent of the soil surface. The Carrizo soil is deep and excessively drained, formed in recent alluvium derived from mixed rock, and occurs on nearly level flood plains. Pebbles and cobbles typically cover between 40 to 80 percent of the soil surface.

The corresponding ecological site for these soils is Limy Upland Deep 7-10 inches precipitation zone.

Map Units:
Denure-Coolidge, 1-3% slope
Denure-Rillito-Why, 1-5% slope

The Denure- Coolidge complex, 1 to 3 percent slopes map unit occurs on nearly level fan terraces. This unit is approximately 55 percent Denure soils and 25 percent Coolidge soils. Up to about 20 percent of this unit may include small areas of occasionally flooded Carrizo, Cuerda, and Mohall soils, Why soils on flood plains, and Dateland, Momoli, and Rillito soils on fan terraces. The Denure soil is deep, somewhat excessively drained, and formed in alluvium derived from mixed rock. Pebbles typically cover between 20 and 50 percent of the soil surface. Coolidge soil is deep, well drained, and formed in alluvium derived from mixed rock. Pebbles typically cover between 10 to 50 percent of the soil surface.

The Denure-Rillito-Why complex, 1 to 5 percent slopes map unit occurs on fan terraces dissected by flood plains. This unit is 40 percent Denure soils, 25 percent Rillito soils, and 15 percent Why soils. Up to 20 percent of this map unit may include small areas of Coolidge and Momoli soils on low fan terraces, Chuckwalla and Gunsight soils on the higher fan terraces, and Carrizo soils on the flood plains. The Denure soil is deep and somewhat excessively drained, formed in alluvium

derived from mixed rock, and occurs on nearly level and gently sloping summits and sides of low fan terraces. Pebbles typically cover between 20 to 50 percent of the soil surface. The Rillito soil is deep and somewhat excessively drained, formed in alluvium derived from mixed rock, and occurs on slightly higher low fan terraces. Pebbles typically cover 35 to 80 percent of the soil surface. The Why soil is deep and somewhat excessively drained, formed in stratified alluvium derived from mixed rock, and occurs on nearly level floodplains. Pebbles typically cover 1 to 10 percent of the soil surface.

The corresponding ecological site for these soils is Limy Fan 7-10 inches precipitation zone.

Map Units:
Cipriano-Hyder-Rock outcrop, 15-65% slope

The Cipriano-Hyder-Rock outcrop, 15 to 65 percent slopes map unit occurs on basalt hills and mountains. This map unit is 40 percent Cipriano soils, 15 percent Hyder soils, and 15 percent Rock outcrop. Up to 30 percent of this map unit may include small areas of Carrizo soils on flood plains, Cherioni soils on summits and the lower part of hills, and Momoli on fan terraces. The Cipriano soil is very shallow and somewhat excessively drained, formed in alluvium derived from basalt rock, and occurs on moderately steep, lower colluvial hills and mountains. Cobble typically covers 50 to 90 percent of the soil surface. The Hyder soil is very shallow and somewhat excessively drained, formed in alluvium and colluvium derived from basalt rock, and occurs on moderately to very steep upper hills and mountains. Stones, cobble, and pebbles typically cover 60 to 90 percent of the soil surface. The Rock outcrop consists of exposed areas of basalt and occurs on moderately to very steep upper hills and mountains.

The corresponding ecological site for this soil is Basalt Hills 7-10 inches precipitation zone.

Map Unit:
Carrizo-Momoli complex, 0-3% slopes

Carrio-Momoli complex, 0 to 3 percent slopes map unit is on long, narrow flood plains (washes) and on fan terraces and alluvial fans in areas where washes emerge from the mountains. This unit is 65 percent Carrizo soil and 25 percent Momoli soil. Carrizo soil is on the nearly level alluvial fans adjoining the washes and Momoli soil is on the higher fan terraces. Carrizo soil is deep and excessively drained formed in recent alluvium derived from mixed rocks with 40 to 80 percent of the surface covered in with pebbles and cobbles. Momoli soil is deep and somewhat excessively drained and formed in alluvium derived from mixed rocks with 45 to 75 percent of the surface covered with pebbles.

The ecological site associated with this soil is Sandy Wash 7-10 inches precipitation zone.

Map Unit:
Quilotosa-Momoli-Carrizo complex, 1-15% slopes

Quilotosa-Momoli-Carrizo complex, 1 to 15 percent slopes occurs on low granite hills and fan terraces dissected by flood plains. This map unit is about 40 percent Quilotosa soil, 20 percent

Momoli soil, and 15 percent Carrizo soil. Up to 25 percent of this map unit may include small areas of Vaiva soils and granite rock outcrop on low hills, Cipriano and Comobabi soils on high fan terraces near hills, and Gunsight Pinamt and Rillito soils on fan terraces.

The Quilotosa soil is very shallow, somewhat excessively drained, and formed in alluvium and colluvium derived from granite and gneiss. Typically 45 to 75 percent of the soil surface is covered with pebbles, cobbles, and stones. The Momoli soil is deep, somewhat excessively drained, and formed in alluvium derived from granite and gneiss. Typically, 45 to 75 percent of the soil surface is covered with pebbles. The Carrizo soil is deep, excessively drained, and formed in recent alluvium derived from granite and gneiss. Typically 40 to 80 percent of the soil surface is covered with pebbles and cobbles.

The ecological site associated with this soil is Granitic Upland 7-10 inches precipitation zone.

Map Unit:
Cherioni-Coolidge complex 1-15% slopes

Cherioni-Coolidge complex, 1 to 15 percent slopes occurs on basalt flows, hills, and fan terraces. The Map unit is 60 percent Cherioni soils and 25 percent Coolidge soil with small areas of Denure soils on fan terraces, cipriano soils on the side slopes of basalt hills, Rositas soil on dunes, Why soils on flood plains (washes), and areas of basalt rock outcrop.

The Cherioni soil is an extremely gravelly loam on nearly level basalt flows and are shallow to very shallow and are somewhat excessively drained. They formed in resiguum and colluvium derived dominantly from basalt. Typically, 60 to 95 percent of the surface is covered with varnished pebbles and pan fragments. The Coolidge soil is deep and well drained formed in alluvium derived dominantly from mixed rocks. Typically, 20 to 50 percent of the surface is covered with pebbles. Permeability is moderately rapid and water capacity is moderate.

The ecological site associated with this soil is Limy Upland 3-7 inches precipitation zone.

Map Unit:
Coolidge complex 0-3% slopes

Coolidge complex, 0 to 3 percent slopes occurs on broad fan terraces that form basin like areas between basalt flows. The map unit is about 60 percent Coolidge gravelly very fine sandy loam to 30 percent Coolidge loamy fine sand. The Coolidge soil is deep and well drained formed in alluvium derived dominantly from mixed rocks. Typically, 20 to 50 percent of the surface is covered with pebbles. Permeability is moderately rapid and water capacity is moderate.

The ecological site associated with this soil is Limy Fan 3-7 inches precipitation zone.

2.3 Biological Resources

2.3.1 Major Land Resource Areas

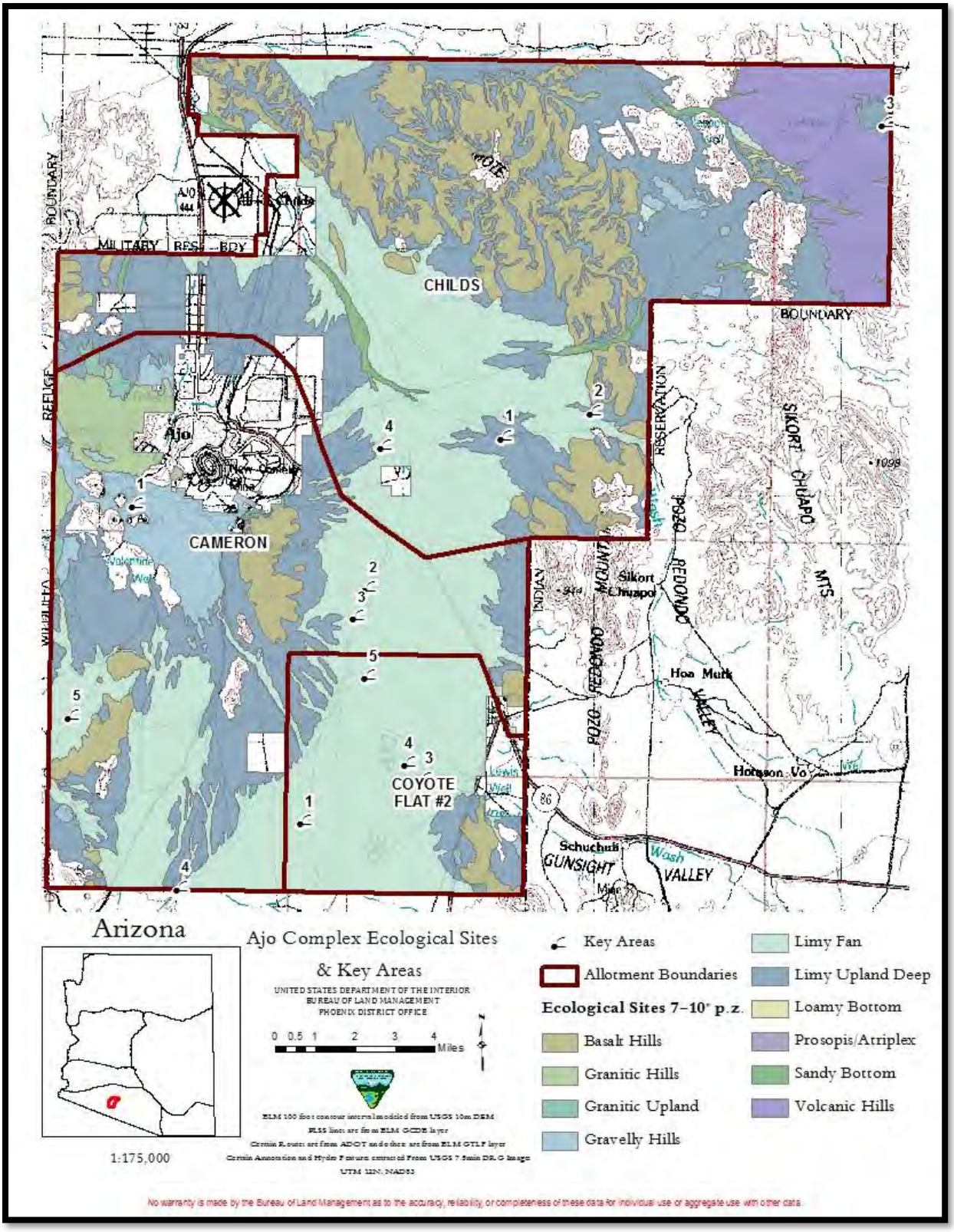
The Ajo/Sentinel Complex lies within Major Land Resource Area (MLRA) 40, Sonoran Basin and Range and more specifically this area is part of the Colorado Sonoran Desert Common Resource

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

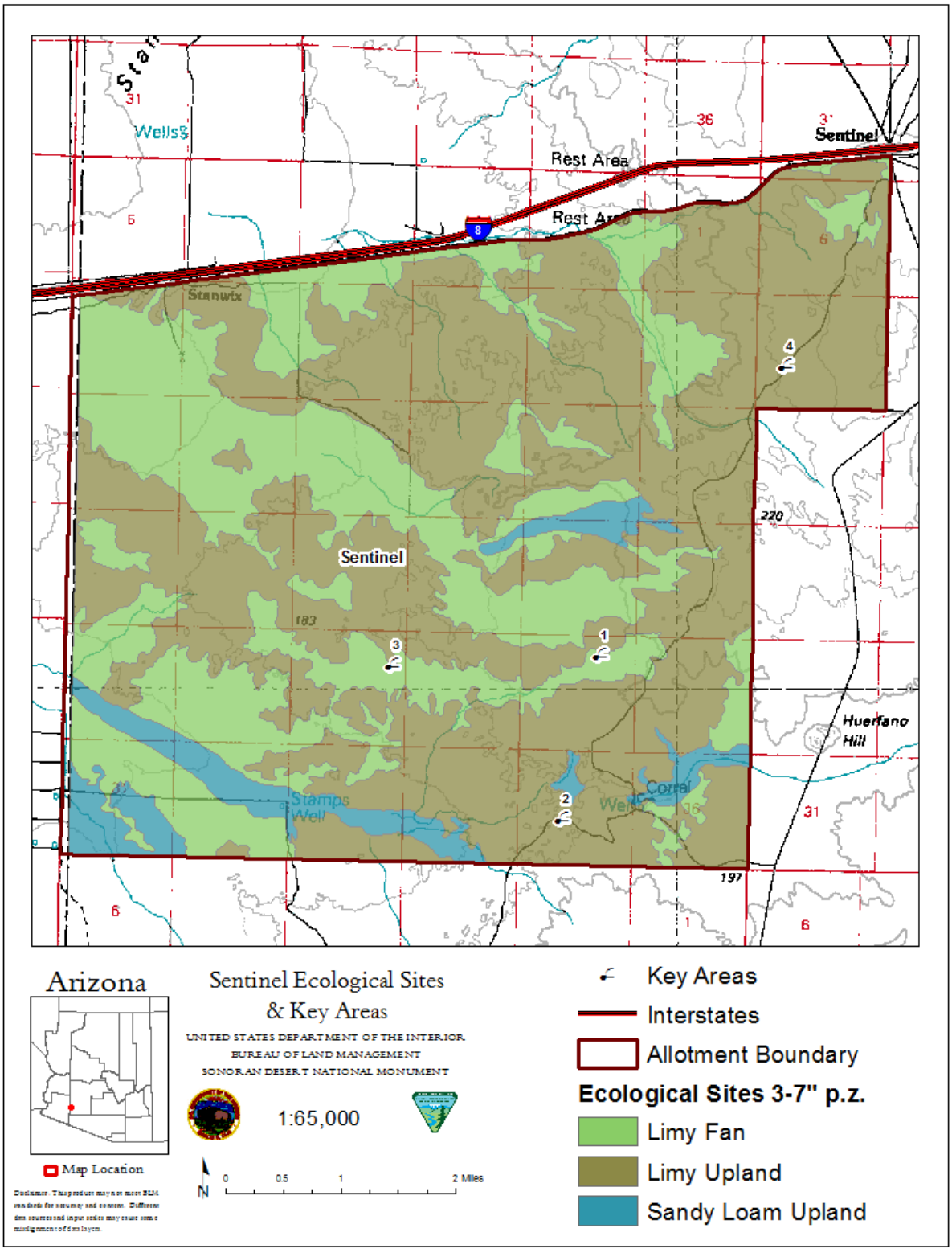
2.3.2 Ecological Sites and Associated Vegetation Communities

An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a specific 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.

Ecological sites are named and classified based on soil parent material or soil texture and precipitation zone (p.z.). There are several ecological sites that occur within the Ajo/Sentinel Complex (Map 3 and 4). The dominant ecological sites on public lands within the complex are described below. NRCS provides Ecological Site Descriptions (ESD) used below and are available online at https://esis.sc.egov.usda.gov/.



Map 3: Ajo Complex Ecological Sites and Key Areas



Map 4: Sentinel Ecological Sites and Key Areas

Limy Upland 7-10" p.z. Deep Site ID: R040XB208AZ
Limy Upland 7-10" p.z. Deep site makes up approximately 53,582 acres (25%) of the Ajo/Sentinel Complex. This site occurs on gently sloping fan terraces and is often intermingled with desert pavement or sandy loam swale ecological sites. Slopes on these sites range between 1 and 15 percent and elevation between 1000 and 2100 feet. These are deep soils with high gravel content and are calcareous throughout. The soil surface layer texture ranges from very gravelly sandy loam to extremely gravelly fine sandy loam, and usually has a well-developed layer of gravel or caliche fragments. The soils subsurface texture is loamy. Plant-soil moisture relationships are poor.

The ESD describes a plant community that is dominated by creosote (*Larrea tridentata*) with an understory of burrobush (*Ambrosia dumosa*). Some other shrub species that may be present are range ratany (*Krameria erecta*) and ocotillo (*Fouquieria splendens*) as well as some succulent species such as buckhorn cholla (*Cylindropuntia acanthocarpa*) and teddybear cholla (*Cylindropuntia bigelovii*). This site can produce a large quantity of growth of annual grasses and forbs following a rain event. Because the plant community is dominated by primarily unpalatable species, species composition is less susceptible to change with heavier grazing pressure. Annual plant production ranges between 150 and 350 pounds of air-dry weight per acre depending on available moisture.

Limy Upland 3-7" p.z. Site ID: R040XD409AZ
Limy Upland 3-7" p.z. site makes up 19,914 acres (20%) of the Ajo/Sentinel Complex. This ecological site occurs on fan terraces, ridgetops, pediments and mesa tops with slopes ranging from 1 to 7 percent and elevations from 400 to 1,000 ft. Soils are shallow over strongly cemented lime pans (duripans) which stop water movement and curtail root penetration. The soils are coarse to loamy textured formed in old alluvium of mixed origins and are very calcareous. The soil surface is often protected by gravel or cryptogams or a combination of both. Plant-soil moisture relationships are poor.

The ESD describes a plant community that is dominated by creosote with an understory of burrobush. Some other shrub species that may be present are range ratany and ocotillo as well as some succulent species such as buckhorn cholla and teddybear cholla. This site can produce a large quantity of annual grasses and forbs following a rain event. Because the plant community is dominated by unpalatable species, species composition is less susceptible to change with heavier grazing pressure. Annual plant production ranges between 100 and 300 pounds of air-dry weight per acre depending on available moisture. The limy uplands of the Sentinel allotment are particularly dry and receive limited run-on moisture.

Limy Fan 7-10" p.z. Site ID: R040XB207AZ
Limy Fan 7-10" p.z. site makes up 42,167 acres (20%) of the Ajo/Sentinel Complex. This site occurs on nearly level to gently sloping fan terraces and old stream terraces no longer flooded, with slopes ranging from 1 to 3 percent, and elevations between 1000 and 2000 feet. These are deep soils that are calcareous throughout and formed in loamy alluvium of moderate age and from mixed origins. Soil surface texture ranges from gravelly loam, sandy loam, to fine sandy loam surface textures. Subsurface texture is loamy. Plant-soil moisture relationships are poor to fair.

The ESD describes a plant community that is a mixture of desert shrubs such as creosote bush, succulents such as saguaro (*Carnegia gigantea*), and annual forbs and grasses. Other shrub species that may be present are triangle bursage (*Ambrosia deltoidea*) and white ratany (*Krameria grayi*). Introduced annual forbs and grasses such as filaree (*Erodium spp.*) and mediterranean grass (*Schismus barbatus*) are very common on these sites, and compete with native annual forbs and grasses. Because the plant community is dominated by primarily unpalatable species, species composition is less susceptible to change with heavier grazing pressure. Annual plant production is between 200 and 700 pounds of air-dry weight per acre depending on available moisture.

Limy Fan 3-7" p.z. Site ID: R040XD405AZ

Limy Fan 3-7" p.z. site makes up 29,852 acres (14%) of the Ajo/Sentinel Complex. This ecological site occurs on fan and stream terraces with slopes ranging from 1 to 3 percent and elevations from 75 to 1,000 ft. These are deep calcareous soils formed in loamy alluvium of moderate age and mixed origins. They range from sandy loam to loamy surface textures. Subsurface texture may include fine or coarse loam. Surface gravel and cryptogams can be common on this site. Plant-soil moisture relationships are poor to fair. The potential plant community is dominated by desert shrubs with few other shrub and cacti species. Most perennial species found on these sites are unpalatable to livestock (cattle). This site has the potential to produce large quantities of annual forbs and grasses during years with above average precipitation (ephemeral forage).

The ESD describes a plant community that is a mixture of desert shrubs such as creosote bush, succulents such as saguaro and annual forbs and grasses. Other shrub species that may be present are triangle bursage and white ratany. Introduced annual forbs and grasses such as filaree and mediterranean grass are very common on these sites, and compete with native annual forbs and grasses. Because the plant community is dominated by primarily unpalatable species, species composition is less susceptible to change with heavier grazing pressure. Annual plant production is between 100 and 600 pounds of air-dry weight per acre depending on available moisture.

Basalt Hills 7-10" p.z. Site ID: R040XB201AZ

Basalt Hills 7-10" p.z. sites make up approximately 26,551 acres (12%) of the Ajo/Sentinel Complex. This site occurs on hillslopes and mountain and ridgetops with slopes ranging between 15 and 50 percent, and between 1100 and 2000 feet elevation. The soils are shallow loams that are calcareous throughout. They are formed on basalt, diabase, and related igneous rock. The soil surface texture ranges from gravelly loam, very gravelly fine sandy loam, and very cobbly sandy loam and has a well-developed cover of cobble or stone. Soil subsurface texture is loamy. Large areas of talus or rock slides are intermingled with soil areas throughout and make up about 15 to 30 percent of the site. The plant-soil moisture relationship is fair to poor.

The ESD describes a perennial plant community that is a mixture of desert trees such as foothill palo verde (*Parkinsonia microphylla*), shrubs such as brittlebush (*Encelia farinosa*) and cacti such as buckhorn cholla with annual forbs and grasses that are common when moisture is available. Perennial grass species such as big galleta (*Pleuraphis rigida*) and bush muhly (*Muhlenbergia porteri*) may be present on this site, but are highly dependent on summer and winter growing season conditions. Other plant species that may be common on this site are shrubs such as creosote and subshrubs such as burrobush (*Ambrosia dumosa*) and desert globemallow (*Sphaeralcea ambigua*). The dominant perennial shrub species associated with this

ecological site are very drought sensitive and can experience between a 50 and 75 percent plant mortality after a period of severe drought. The annual plant production ranges between 250 and 650 pounds of air-dry weight per acre depending on available moisture.

Granitic Upland 7-10" p.z. Site ID: R040XB220AZ

Granitic Upland 7-10" p.z. sites make up approximately 1,108 acres (0.5%) of the Ajo/Sentinel Complex. This ecological site occurs on pediments, undulating uplands and areas around the low desert with slopes ranging between 15 and 65 percent and an elevation between 1000 and 2500 feet. These soils are shallow to very shallow and non-calcareous. They are formed on acid and intermediate igneous parent materials, and sandstone, quartzite, arkose, and gneiss. The soil surface texture ranges from gravelly sandy loam to very gravelly loam and typically have well developed gravel covers. The soil subsurface texture is loamy and course throughout. Plant-soil moisture relationships are poor.

The ESD describes a plant community that is a mixture of desert trees such as foothill palo verde, shrubs such as flattop buckwheat (*Eriogonum fasciculatum*) and triangle bursage, cacti such as saguaro, and perennial grasses and forbs such as bush muhly and desert trumpet (*Eriogonum inflatum*). Annuals are of minor importance to the plant community. The tree species present on this site tend to look shrubby due to the shallowness of the soil.

Sandy Wash 7-10" p.z. Site ID: R040XB216AZ

Sandy Wash sites make up approximately 1,698 acres (1%) of the Ajo/Sentinel Complex. This ecological site occurs in floodplains and alluvial fans. Slopes range from 0 to 3 percent, and elevations range from 900 to 2000 feet. This site benefits significantly from run-in moisture from adjacent areas. The soils may suffer loss from run-off. Soils are deep to bedrock or other plant root restricting layers. Soil surface textures range from gravelly loam, very gravelly loamy sand, to sandy loam. The soil subsurface textures range from sandy loam to very cobbly loam. They may or may not be calcareous. The underlying layers have rapid permeability and hold most moisture the climate supplies. With good vegetative cover, infiltration rates are high and stability against erosion is poor. Plant-soil moisture relationships are very good due to the extra run-on moisture.

The ESD describes a plant community that is a diverse mixture of desert trees such as blue palo verde (*Parkinsonia florida*), shrubs such as desert broom (*Baccharis sarothroides*), vines such as fringed twinevine (*Funastrum cynanchoides*), perennial grasses such as big galleta and annual grasses and forbs. The active wash areas have little vegetation except burrobush (*Ambrosia monogyra)* and annual grasses and forbs. Other species that are common on this site include trees such as foothill palo verde, velvet mesquite (*Prosopis velutina*), and ironwood (*Olneya tesota*), shrubs such as wolfberry (*Lycium sp.*), catclaw acacia (*Acacia greggii*), and creosote bush. Annual vegetative production is expected to be between 950 and 1675 pounds air-dry weight per acre.

Sandy Loam Deep 7-10" p.z. Site ID: R040XB221AZ

Sandy Loam Deep make up approximately 2,000 acres (1%) of the Ajo/Sentinel Complex. This ecological site is found on fan and stream terraces with slopes ranging from 1 to 8 percent and elevations from 1,200 to 2,000 ft. Soils are deep formed from sandy alluvium of mixed origins. The soils are sandy loam throughout with non-clayey cambic horizons. These soils are non-

calcareous in the first 4 to 6 inches. The soil surfaces are loamy with few gravels. Plant-soil moisture relationships are fair to good.

The ESD describes a plant community as a mixture of desert trees such as mesquite and palo verde, shrubs such as ratany and bursage, and cacti with minor amounts of perennial grasses such as big galleta and forbs. This ecological site has the potential to produce a large amount of annual forbs and grasses during wet years (ephemeral forage).

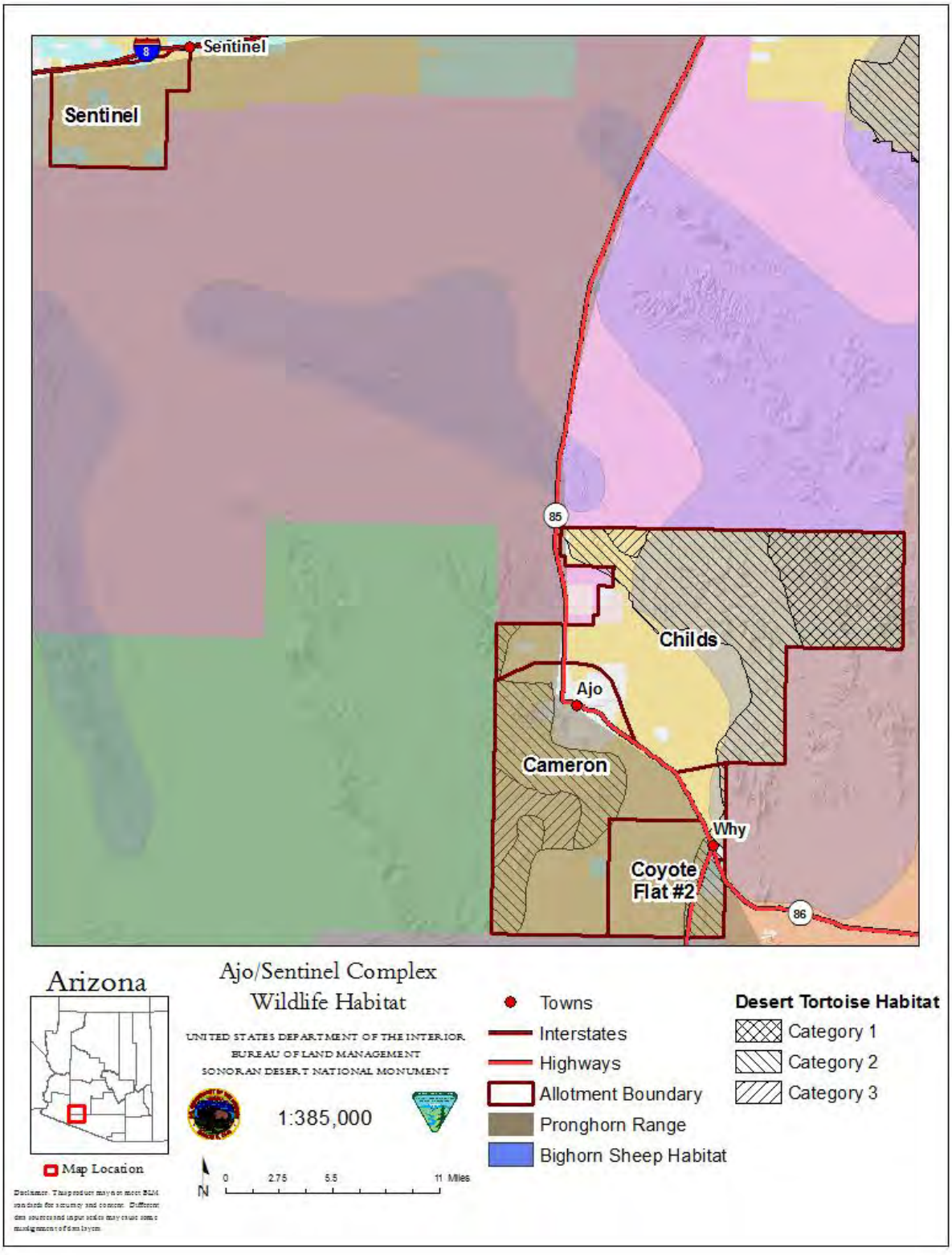
2.3.4 General Wildlife Resources

Game Species and Furbearers
Within the Ajo/Sentinel Complex, suitable habitat exists for big game species such as desert bighorn sheep (*Ovis canadensis mexicana*, Map 4), mule deer (*Odocoileus hemionus*), javelina (*Pecari tajacu*), and mountain lion (*Puma concolor*). The Ajo/Sentinel Complex also provides suitable habitat for common furbearers, including raccoons (*Procyon lotor*), bobcats (*Lynx rufus*), coyotes (*Canis latrans*), gray foxes (*Urocyon cinereoargenteus*), striped and striped skunks (*Mephitis mephitis*), and badgers (*Taxidea taxus*). Common small game species include Gambel's quail (*Callipepla gambelii*) mourning dove (*Zenaida macroura*), white-winged dove (*Z. asiatica*), and cottontail rabbits (*Sylvilagus audubonii*).

Reptiles
A variety of reptiles may be present in or near the Ajo/Sentinel Complex allotments including rosy boas (*Lichanura trivirgata*), chuckwallas (*Sauromalus ater*), western diamondback rattlesnake (*Crotalus atrox*), sidewinder rattlesnake (*Crotalus cerastes*), Gila monster (*Heloderma suspectum*) and desert iguanas (*Dipsosaurus dorsalis*).

Aquatic and Riparian Obligate Species
Fish are not present on the Ajo/Sentinel Complex due the lack of persistent surface water, which also limits the occurrence of riparian obligate migratory bird species and amphibians.

Raptors
Xero-riparian and upland habitat on the Ajo/Sentinel Complex supports red-tailed hawks (*Buteo jamaicensis*), Harris' hawks (*Parabuteo unicinctus*), and American kestrels (*Falco sparverius*). Owl species may include the western screech owl (*Megascops kennicottii*), great-horned owl (*Bubo virgineanus*), elf owl (*Micrathene whitneyi*), and the barn owl (*Tyto alba*).



Map 4: Wildlife Habitat Map.

2.3.5 Special Status Species, T&E

Sonoran Desert Tortoise

Sonoran desert tortoises (*Gopherus morafkai*) are a BLM sensitive species that may occupy upland areas in the Ajo/Sentinel Complex. Tortoises tend to occupy hillsides and ridges with outcrops of large boulders as well as incised washes possessing caliche caves but may be found in lower densities elsewhere. Desert washes are important to Sonoran desert tortoises as they provide exposed banks with variable aspects, exposed caliche caves for locating burrows, and xeroriparian vegetation for thermal cover (Oftedal 2002). 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 Ajo/Sentinel Complex contains all three categories of desert tortoise habitat (Table 3 and Map 5). Category I habitat is defined as: 1. Habitat Area essential to maintenance of large, viable populations. 2. Conflicts are resolvable. 3. Medium to high density or low density contiguous with medium or high density. 4. Increasing, stable, or decreasing population. 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) populations are low to medium density and not contiguous with medium or high density.

Table 3: Desert Tortoise Habitat Acreages by Allotment

Allotment	Category I Acres	Category II Acres	Category III Acres
Cameron	0	24,725	7,825
Childs	23,585	41,733	1,451
Coyote Flat #2	0	3,898	0
Sentinel	0	0	0

Sonoran Pronghorn

Sonoran pronghorn (*Antilocapra americana sonoriensis*) are an Endangered Species Act (ESA) listed species (Endangered) whose current range occurs south of Interstate 8 (a perceived migration barrier. Much of the Ajo/Sentinel Complex falls within the historic range of the species (approximately 53,324 acres). The southwestern portion of the Ajo/Sentinel Complex has been identified to hold important foraging and fawning habitat for Sonoran Pronghorn. A large portion of the Ajo/Sentinel Complex does fall within Sonoran pronghorn experimental/non-essential habitat, which has been targeted for reintroduction (Table 4). The experimental/ non-essential habitat is managed for successful reestablishment for Sonoran Pronghorn and may be subject to certain mitigation activities or restrictions.

Table 4: Sonoran Pronghorn Range Acreages by Allotment

Allotment	Acres within range of endangered Sonoran pronghorn	Acres within range of NEP area for Sonoran pronghorn	Total Acres
Sentinel	18,537	0	18,537
Childs	4,510	94,335	98,845

Coyote Flat #2	17,795	2,624	20,419

Lesser Long Nosed Bat

The lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) is a small fruit bat found in the southwest region of North America (primarily in northern Mexico and Southern Arizona). This species feeds primarily on the nectar and fruit of saguaro cactus and agave (*Agave sp.*) and, therefore, acts as an important pollinator in the Sonoran Desert. The lesser long-nosed bat was removed from the federal list of Threatened and Endangered Species in April of 2018, but remains a BLM sensitive species. Lesser long-nosed bat density is typically higher near established maternity roost sites from which they may travel up to forty miles to forage in relatively high density saguaro cactus stands. In the Ajo/Sentinel Complex, one roosting site has been identified in the Cameron allotment.

Acuna Cactus

The acuna cactus (*Echinomastus erectocentrus var. acunensis*) is a small columnar cactus, reaching up to 30 centimeters in height. This species is known only to occur in southern Arizona and northern Mexico, found growing on small knolls or gravelly ridges. The acuna cactus is a federally listed endangered species due to declining populations associated with long-term drought and loss of habitat from mining activities or invasive species. The Coffeepot Botanical Area of Critical Environmental Concern, holds one of the few known remaining populations of this species.

2.3.6 Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are areas within public lands that require special management actions to protect existing important and/or rare resources such as wildlife or historical cultural sites. Two ACECs occur within the Ajo/Sentinel Complex. The 2012 Lower Sonoran Record of Decision (ROD) and approved Resource Management Plan (RMP) provides common guidelines for activities that take place on all Lower Sonoran ACECs and a subset of specific guidelines for each ACEC that are designed to facilitate their intended management purpose. Below are the descriptions of the two ACECs and a table listing their specific management guidelines.

- Coffeepot Botanical ACEC

  Location and description: The 8,900 acre Coffeepot Botanical ACEC is located in northeast corner of the Childs allotment, 15 miles northeast of Ajo, AZ. The area was carried over into the 2012 Lower Sonoran RMP after being originally designated in the 1985 Lower Gila South RMP. This area supports a large variety of native plant species with a limited distribution including five special status species. They include California copperleaf (*Acalypha pringlei*); San Francisco River Leather-Petal (*Graptopetalum rusbyi*); Organ-pipe cactus (*Stenocereus thurberi*); acuna cactus, and night-blooming cereus (*Peniocereus greggii*). The acuna cactus is of particular importance as it only occurs on a single soil type within the ACEC. The acuna cactus population is currently declining and more research is needed to find the causal factor. The 2012 Lower Sonoran RMP states that the purpose of this ACEC is to "protect the outstanding botanical diversity of the native and rare plant communities."

AC-1.1.14	The Coffeepot Botanical ACEC designation of approximately 8,900 acres will be retained to protect the outstanding botanical diversity of the native and rare plant communities such as the acuna cactus. All management actions (including remaining open to land and minerals actions) will be the same, except the ACEC will not be closed to off-highway vehicle (OHV) use.
AC-1.1.15	Livestock facilities will not be developed where they will increase livestock use within an area of known or newly discovered populations of acuna cactus. Livestock facilities could be developed to improve natural resource conditions by improving livestock distribution. Adaptive management and best management practices will be utilized to avoid conflicts with wildlife resources.
AC-1.1.16	Existing range improvements will remain in place unless the improvement is no longer needed for livestock operations or wildlife water distribution.

- Cuerda de Lena ACEC

Location and description: The 58,500 acre Cuerda de Lena ACEC is located in the southern portion of the Ajo/Sentinel Complex, adjacent to Ajo, AZ city limits, and spans portions of both the Cameron and Coyote Flat #2 allotments. This ACEC was originally nominated for providing critical habitat for the cactus ferruginous pygmy-owl (*Glaucidium brasilianum*). However, the area also provides important fawning ground for the Sonoran pronghorn, forage for the lesser long-nose bat, and habitat for the desert tortoise. Additionally, the area is part of the homelands of the traditional Tohono O'odham nation and holds valuable information regarding historical activities of their peoples. The 2012 Lower Sonoran RMP states the purpose of this ACEC is "to protect the endangered Sonoran pronghorn; habitat for other wildlife species, including the cactus ferruginous pygmy-owl; and to protect cultural resources."

AC-1.1.17	58,500 acres will be designated as the Cuerda de Lena ACEC. Its purpose will be to protect the endangered Sonoran pronghorn; habitat for other wildlife species, including the cactus ferruginous pygmy-owl; and to protect cultural resources.
AC-1.1.18	In addition to the exclusions addressed in the common to all section, the ACEC will be closed to the public and general recreational use during pronghorn fawning, between March 15 and July 15, or as determined annually by the Sonoran pronghorn recovery team. Minor nonlinear land use authorizations will also be prohibited unless deemed necessary by the authorized officer. Federal, state, and local government employees and permit holders operating within the scope of their authorizations will be exempt from the closure.

AC-1.1.19	Camping will be limited to dispersed and undeveloped sites.
AC-1.1.20	Developed recreational sites will be prohibited within the ACEC, except for small unintrusive information and interpretation facilities.
AC-1.1.21	Tertiary, single-track, and reclaimed vehicle routes that fragment habitat will be closed; however, access will be provided for administrative use and public safety.
AC-1.1.22	Routes in washes will be prohibited, except to provide legal access for law enforcement and other authorized use. New travel routes in washes will be prohibited. New routes will be considered only if deemed necessary for emergency or other authorized administrative uses.

2.3.7 Recreational Resources

The Ajo/Sentinel Complex is surrounded by the BMGR, Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge and the Tohono O'odham reservation. Because access to these areas requires a permit or permission from the corresponding management agency, BLM has designated the entire Ajo/Sentinel Complex an Extensive Recreation Management Area (ERMA) which highlights a close relationship with the Ajo city residents. The purpose of the Ajo ERMA is "to provide local and seasonal residents of Ajo close-to-home recreational destination opportunities." Recreation management in the Ajo ERMA is focused on facilitating popular recreational activities, primarily motorized activities that emphasize the Ajo area's unique features while remaining in agreement with BLM's other management objectives such as maintaining suitable pronghorn habitat. Other popular activities include hiking, mountain biking, equestrian use, wildlife viewing, photography, and sightseeing.

Located within the Ajo ERMA is the Gunsight Wash Special Recreation Management Area (SRMA). SRMAs are defined as a public lands unit identified in land use plans to direct recreation funding and personnel to fulfill commitments made to provide specific, structured recreation opportunities. The Gunsight Wash SMRA encompasses approximately 2,500 acres and was designated to "provide structured and managed camping where the demand is high." This area receives a lot of attention from local and long-distance winter visitors seeking remote winter camping experiences.

3.0 Grazing Management

3.1 Grazing History

Before historic mining settlements came to characterize Ajo, the land was occupied by the Tohono O'odham people who used the area as an important source of water. The Rio Cornez flows through the southeastern portion of Arizona and serves as the major drainage way in the Ajo area. The Tohono O'odham people would also draw water from a series of potholes called Mu'i Wawhia (many wells). In 1847, a miner named Tom Childs became intrigued with the Ajo area while passing through on his way to Sonora. He later returned to Ajo and established the first Anglo-American cattle and mining operations in Ajo.

In the 1860's settlers began to develop farms and livestock operations the area. One of whom was Tom Childs Jr who, following in his father's footsteps, established his ranch 10 miles north of Ajo Mine. He grazed his cattle from Gila Bend all the way down to the United States-Mexico border and eventually grew to run the largest cattle operation in the Ajo area. The second largest cattle operator was John Cameron, a schoolmate of Tom Childs Jr, who began running his cattle in a large portion of land adjacent to Child's allotment. These two primary operators continued to ranch well into the 1900's. In 2006, the Coyote Flat and Why allotments were merged creating the Coyote Flat #2 allotment.

The Sentinel plain was relatively uninhabited, with the exception of small occupations along the Gila River, until the late 1800's when the railroad between Gila Bend and Yuma and later US Highway 80 was constructed facilitating the establishment of service stations and access to the area. Livestock operations soon followed where livestock and agricultural wells were drilled to supply water to the area. Livestock grazed much of the area until the establishment of the BMGR in 1941 which restricted livestock grazing to areas adjacent to what is now Interstate 8.

In 1968 a Special Ephemeral Rule was published in the Federal Register authorizing range managers to classify allotments as ephemeral (annual) rangelands in accordance with 43 CFR 4115.2-4. Many allotments in the area were converted to ephemeral use. Only the allotments where cow-calf operations were in place kept their perennial use status. In 2004, a Decision Record for the Approved Cameron Allotment Amendment to the Lower Gila South Resource Management Plan was signed making the Cameron Allotment unavailable for livestock grazing.

3.2 Current Livestock Grazing Management

A number of water developments and fences are used in the management of livestock across the complex (Map 5 and 6). The water developments formerly used by cattle on the Cameron allotment are continuously being redeveloped for wildlife use. The Childs allotment has limited water distribution and is separated by fences and terrain into three pastures. The Coyote Flat #2 allotment is split into two pastures, north and south, with relatively even water distribution. The Sentinel has even water distribution due to numerous wells and pipeline fed troughs.

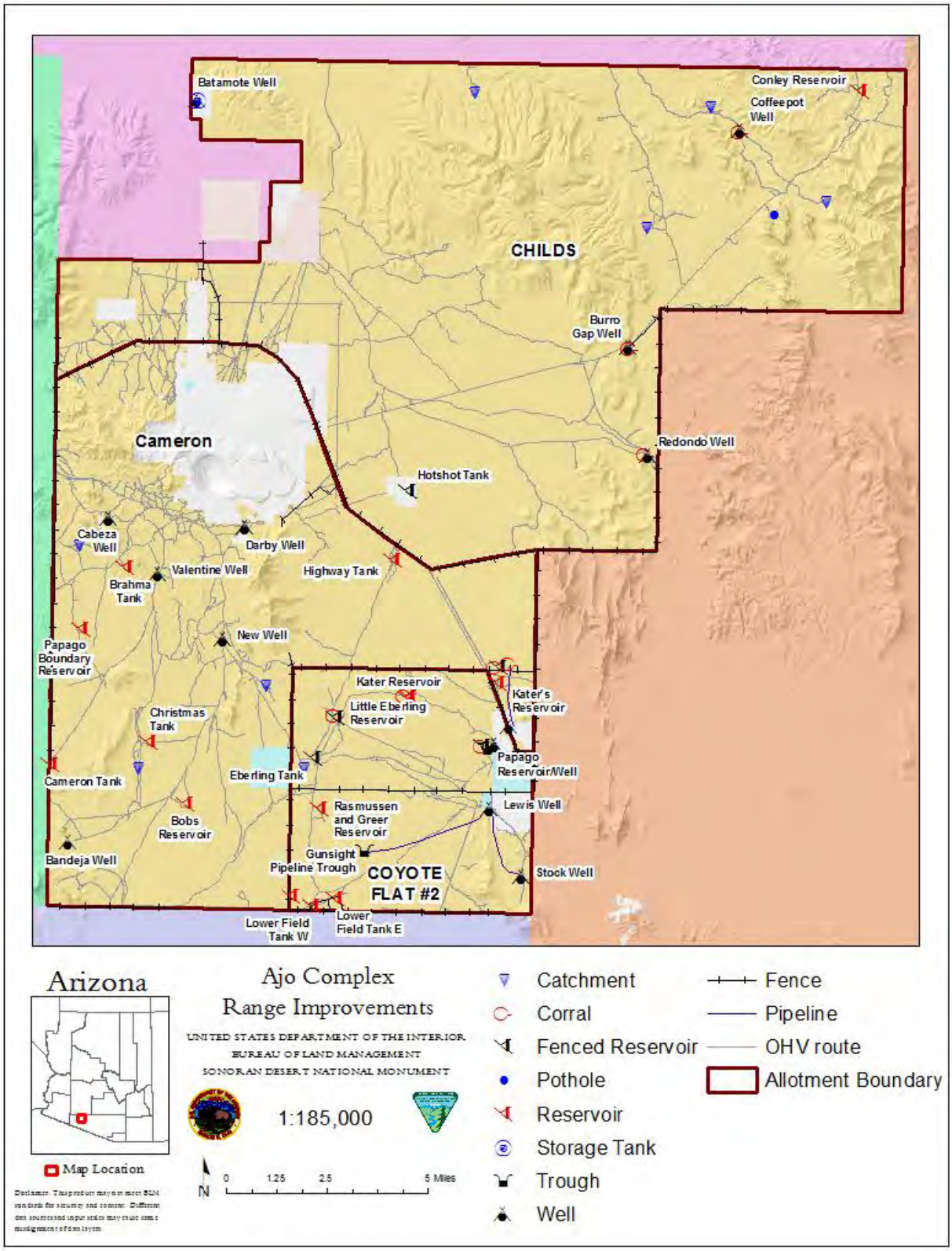
In the 2012 Lower Sonoran RMP, the allotments available for grazing in the Ajo/Sentinel Complex were classified as perennial-ephemeral (Table 2).

This classification corresponds to the following type of designated rangeland:

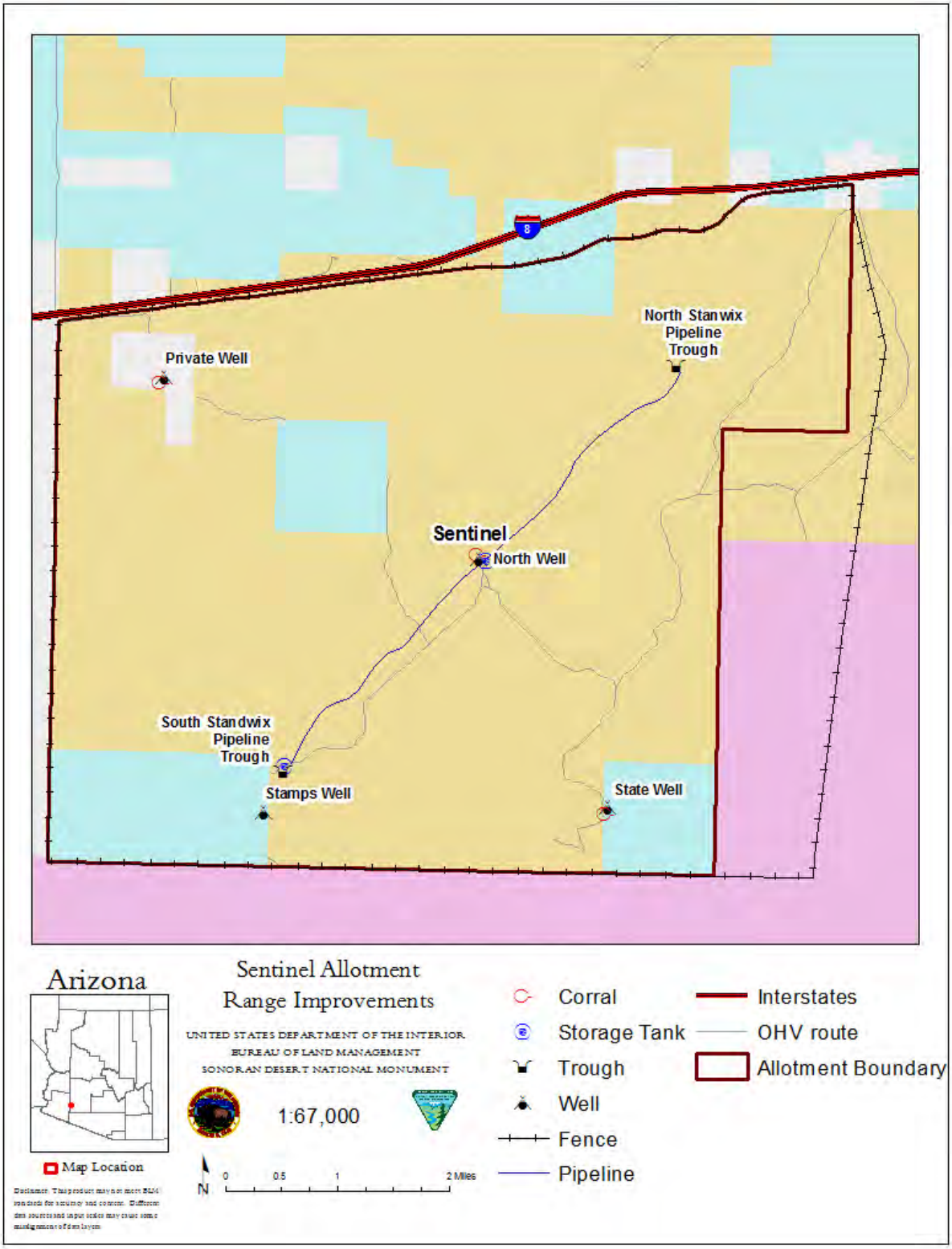
- Perennial-Ephemeral – rangelands that produce perennial forage every year and periodically provide additional ephemeral vegetation. In a year of abundant moisture and favorable climatic conditions, annual forbs and grasses add materially to the total grazing capacity.

The Childs, Coyote Flat #2, and Sentinel allotments are classified as perennial-ephemeral. The 2012 Lower Sonoran RMP provides that the Cameron Allotment is unavailable for livestock grazing (Table 2). Livestock operators on perennial-ephemeral allotments are offered 10-year permits from the BLM that state the number and kind of livestock permitted annually, as well as

the period of use for each allotment. Ephemeral forage is utilized through separate ephemeral use authorizations in accordance with the RMP's Standard Operating Procedures and Best Management Practices as set forth in the Candidate Conservation Agreement for the Sonoran Desert Tortoise in Arizona. These Best Management Practices limit ephemeral grazing to provide adequate forage for all species of wildlife.



Map 5: Ajo Complex Range Improvements



Map 6: Sentinel Allotment Range Improvements

3.3 Mandatory Terms and Conditions for Permitted Use

The classifications and amount of permitted use for the Ajo/Sentinel Complex allotments are listed in Table 5. Permitted use is expressed in animal unit months (AUMs), the amount of forage necessary to sustain one cow-calf pair, or its equivalent, for a period of one month. Terms and conditions for grazing permits and leases must be in conformance with resource management objectives and program constraints, as identified in land use plans.

Table 5: Mandatory Terms and Conditions for the Ajo/Sentinel Complex

Allotment	Allotment Number	Livestock Number	Livestock Kind	Percent Public Land	Type Use	Authorized AUMs
Cameron	03013	0	Cattle	100	Unavailable for grazing	0
Childs	03016	320	Cattle	99	Perennial/Ephemeral	3802
Coyote Flat #2	00106	31	Cattle	97	Perennial/Ephemeral	361
Sentinel	03076	32	Cattle	92	Perennial/Ephemeral	353

4.0 Objectives

4.1 Relevant Planning and Environmental Documents

Livestock grazing on BLM lands is managed under 43CFR 4100, and is based on the Taylor Grazing Act (43 USC 315, 315a-315r), Federal Land Policy and Management Act (FLPMA) (43 USC 1701 et seq.), the Public Rangeland Improvement Act (43 USC 1901 et seq.), and other executive and public land orders. Grazing leases and permits are issued according to 43 CFR 4130.2(d) and generally last 10 years. When leases or permits are scheduled for renewal, the BLM evaluates resource conditions within the allotments consistent with the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (1997, Appendix B). Grazing practices are managed to achieve resource and grazing objectives, as described in the terms and conditions of the grazing permit or lease. All of the Ajo/Sentinel Complex allotments are authorized under section 3 of the Taylor Grazing Act of 1934 as 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 *Lower Sonoran RMP* in 2012.

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.

4.2 Key Area Objectives

Specific Key Area objectives step down from the DPC objectives found in the 2012 Lower Sonoran RMP. These Key Area specific objectives are designed to assess Public Land conformance to the Arizona Standards for Rangeland Health as well as the Taylor Grazing Act; FLPMA; ESA; Clean Water Act; and suitable laws, regulations, and policies.

DPC objectives were developed for each Key Area within the Complex by an interdisciplinary team of BLM resource specialists and biologists. There are 17 active Key Areas on the Ajo/Sentinel Complex. The table below shows the active Key Areas and ecological sites for each Key Area within the complex:

Allotment	Key Area	Ecological Site
Cameron	KA1	Granitic Upland 7-10" p.z.
	KA2	Limy Fan 7-10" p.z.
	KA3	Limy Fan 7-10" p.z.
	KA4	Sandy Wash 7-10" p.z.
	KA5	Limy Fan 7-10" p.z.
Childs	KA1	Limy Upland, Deep 7-10" p.z.
	KA2	Sandy Loam Deep 7-10" p.z.
	KA3	Limy Upland 7-10" p.z.
	KA4	Limy Fan 7-10" p.z.
Coyote Flat #2	KA1	Limy Fan 7-10" p.z.
	KA2	abandoned
	KA3	Limy Fan 7-10" p.z.
	KA4	Sandy Wash 7-10" p.z.

	KA5	Limy Fan 7-10" p.z.
Sentinel	KA1	Basalt Hills 3-7" p.z.
	KA2	Sandy Wash 3-7" p.z.
	KA3	Limy Fan 3-7" p.z.
	KA4	Limy Upland 3-7" p.z.

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. Arizona Standards for Rangeland Health and DPC objectives, and the rationale for each objective, are given below.

4.2.1 Arizona Standards for Rangeland Health Standard 1- Upland Sites, applies to all Key Areas.

Objective: Maintain or restore upland, channel, and riparian components of watershed that help stabilize or improve watershed conditions; and disturbance of sensitive soil surfaces, including those classified as highly susceptible to wind and water erosion and those with protective desert pavement or well-developed cryptogamic crust, would be avoided (2012 Lower Sonoran RMP). 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 with NRCS Ecological Site Guides and/or Reference Sheets. Deviations that are "none to slight" or "slight to moderate" from the appropriate site guide or reference sheet 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 Arizona Standards for Rangeland Health Standard 2 – Riparian Sites

Objective: Ensure wetlands and riparian areas are functioning appropriately and are consistent with Land Health Standards.

There are no wetland or riparian areas within the Ajo/Sentinel Complex; therefore, Standard 2 does not apply and no objectives were established.

4.2.3 Arizona Standards for Rangeland Health Standard 3- Desired Resource Condition Objectives

Objective: Maintain or restore vegetative communities to achieve DPC objectives, as described in NRCS Ecological Site Descriptions, to protect soils from wind and water erosion and to maintain vegetation communities' natural range of variation in plant community composition (2012 Lower Sonoran RMP).

The BLM ascertains achievement of Standard 3 by determining how the existing vegetation and ground cover of a Key Area differs from the DPC for the respective ecological site. If 50% or more of the objectives are not achieved the site fails to achieve this Standard.

For this Standard, DPC objectives are site-specific. Therefore, Key Areas located on similar stratum may have different 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 following Key Area specific DPC objectives would be expected to provide cover and desirable forage, as defined in the ESDs, to sustain both wildlife and livestock perennially and prevent accelerated erosion on the sites.

Key Area Specific Desired Plant Community Objectives

Cameron Allotment:
Cameron Key Area 1:
Key Area 1, Granitic Upland 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥20%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a bare ground cover of ≤10%

Rationale: This Key Area is located at an elevation of approximately 2000 feet. This Key Area is approximately 1.4 miles northeast of Brahma Tank.

The rationale for DPC objectives is taken from the NRCS Granitic Upland 7-10" p.z. reference sheet (R040XB220AZ). The reference sheet shows a canopy cover of 15-20% with a composition of 50% shrubs, 23% trees, 25% succulents, and 1-2% perennial grasses. Maintaining or exceeding a vegetative canopy cover of 20% is appropriate for this site and is expected to provide cover for wildlife and soil site stability. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet calls for a bare ground cover class from 10-60%. Bare ground cover is low in the presence of high gravel cover. Due to high gravel cover, maintaining the minimum or less of the bare ground cover class at 10% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Cameron Key Area 2:
Key Area 2, Limy Fan 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥15%
- Maintain a composition of perennial grass ≥1%
- Maintain a cryptogam cover of ≥ 10%
- Maintain a bare ground cover of ≤60%

Rationale:
This Key Area is located at an elevation of approximately 1641 feet. This site is approximately 1.1 miles southwest of Cameron Tank.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees and 30% succulents. Maintaining or exceeding a vegetative canopy cover of 15% is appropriate for this site and is expected to provide cover for wildlife and soil site stability. This site has the potential to produce perennial grass but comprises a small percentage of the vegetation community. Maintaining or exceeding a perennial grass composition of ≥1% is

appropriate for this site. The reference sheet calls for a bare ground cover class from 10-60% and a cryptogram cover class from 10-15%. Maintaining the maximum or less of the bare ground cover class at 60% and a cryptogram cover of ≥10% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Cameron Key Area 3:

Key Area 3, Limy Fan 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥15%
- Maintain a cryptogam cover of ≥ 10%
- Maintain a bare ground cover of ≤60%

Rationale:

This Key Area is located about 1.9 miles southwest of Cameron Tank at an elevation of approximately 1647 feet.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees and 30% succulents. Maintaining or exceeding a vegetative canopy cover of 15% and is appropriate for this site and is expected to provide cover for wildlife and soil site stability. The reference sheet calls for a bare ground cover class from 10-60% and a cryptogram cover class from 10-15%. Maintaining the maximum or less of the bare ground cover class at 60% and a cryptogram cover of ≥10% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Cameron Key Area 4:

Key Area 4, Sandy Wash 7-10" precipitation zone ecological site

- Maintain a tree composition of ≥10%
- Maintain vegetative canopy cover at ≥70%.
- Maintain a Bare Ground cover class of ≤15%

Rationale: This Key Area is located at an elevation of 1494 feet. It is within an ephemeral wash that branches off of the Rio Cornez and is approximately 3 miles southeast of Bandeja Well.

Rationale for DPC objectives is taken from the NRCS Sandy Wash 7-10" p.z. reference sheet (R040XB216AZ). The reference sheet shows a foliar cover of 60-70%, of which 10-30% is perennial grass, 40% is shrubs, 10% is subshrubs, 10% is perennial forbs, and 5-10% trees. The steepness of this wash site's banks limits the establishment of shallow rooted plant species and promotes a tree dominated state which lacks perennial grass species. The ecological site guide shows a tree composition of 5-10%. Maintaining or exceeding a vegetative canopy cover of ≥70% and a tree composition of ≥10% can provide cover for wildlife and erosion control appropriate to this site. The reference sheet shows a bare ground cover class of 15-40%. Maintaining the minimum or less of the bare ground cover class at 15% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Cameron Key Area 5:

Key Area 5, Limy Fan 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥10%
- Maintain a cryptogam cover of ≥ 10%
- Maintain a bare ground cover of ≤35%

Rationale: The site is located at an elevation of 1685 feet. It is approximately 1.1 miles northeast of Cameron Stock tank.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees and 30% succulents. Maintaining or exceeding a vegetative canopy cover of 10% is appropriate for this site and is expected to provide cover for wildlife and soil site stability. The reference sheet calls for a bare ground cover class from 10-60% and a cryptogram cover class from 10-15%. Maintaining the midpoint or less of the bare ground cover class at 35% and a cryptogram cover of ≥10% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Childs Allotment:

Childs Key Area 1:

Key Area 1, Limy Upland 7-10" Deep precipitation zone ecological site

- Maintain vegetative canopy cover at ≥ 6%.
- Maintain a perennial grass composition of ≥9%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a Bare Ground cover class of ≤35%

Rationale: This site is located at an elevation of 1702 feet. It is located approximately 0.9 miles south of the Rio Cornez, the major drainage running through the Ajo area.

Rationale for DPC objectives is taken from NRCS Limy Upland 7-10" p.z. Deep reference sheet (R040XB208AZ). The reference sheet shows a canopy cover of 3-9%, with a composition of 50% shrubs, 20% trees, and 30% succulents. Maintaining or exceeding the midpoint of a vegetative canopy cover of ≥6% is appropriate for this site and is expected to provide cover for wildlife and soil site stability. The ESD shows the potential for perennial grass to comprise up to 9% of the site's annual production. Maintaining ≥9% of perennial grass by composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet shows bare ground to be between 10-60% with low values in high gravel cover areas and/or El Nino years. Maintaining the midpoint or less of the bare ground at 35% is appropriate to this site and would be expected to prevent accelerated erosion on this naturally bare site.

Childs Key Area 2:

Key Area 2, Sandy Loam, Deep 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥15%
- Maintain a perennial grass composition of ≥17%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a Bare Ground cover class of ≤35%

Rationale: This Key Area is located at an elevation of 1759 feet. It is approximately 1.4 miles northwest of Redondo Well.

Rationale for DPC objectives is taken from NRCS Sandy Loam, Deep 7-10" p.z. reference sheet (R040XB221AZ). The reference sheet shows a canopy cover of 15-25% and a composition of 60% shrubs, 9% trees, and 17% perennial grass. Maintaining or exceeding the minimum vegetative canopy cover of ≥15% is appropriate for this site. The ESD shows the potential for perennial grass to comprise up to 17% of the vegetation community. Maintaining or exceeding 5% perennial grass by composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet shows bare ground to be between 10-60%. Maintaining the midpoint or less of the bare ground at 35% is appropriate to this site and would be expected to prevent accelerated erosion on this naturally bare site.

Childs Key Area 3:

Key Area 3, Limy Upland 7-10" precipitation zone ecological site

- Maintain vegetative canopy cover at ≥20%.
- Maintain a perennial grass composition ≥ 9.5%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a Bare Ground cover class of ≤35%

Rationale: This Key Area is located at an elevation of 1992 feet. It is located within the Coffeepot Botanical ACEC and is approximately 1.3 miles southeast of Conley reservoir.

Rationale for DPC objectives is taken from NRCS Limy Upland 7-10" p.z. reference sheet (R040XB210AZ). The reference sheet shows a canopy cover of 20-25% with a composition of 50% shrubs, 20% trees, and 30% succulents. Maintaining or exceeding a vegetative canopy cover of ≥20% is appropriate for this site. The ESD shows the potential for perennial grass to comprise up to 9.5% of the vegetation community. Maintaining ≥ 9.5% perennial grass by composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining or exceeding 5% desirable palatable browse is appropriate for this site. The reference sheet shows bare ground to be between 10-60% with low values in high gravel cover areas and/or El Nino years. Maintaining the midpoint or less of the bare ground at 35% is appropriate to this site and would be expected to prevent accelerated erosion on this naturally bare site.

Childs Key Area 4:

Key Area 4, Limy Fan 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥15%
- Maintain a composition of perennial grass ≥1%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a cryptogam cover of ≥ 10%
- Maintain a Bare Ground cover class of ≤35%

Rationale: This Key Area is located at an elevation of 1624 feet. It is approximately 1 mile northwest of Hotshot reservoir.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees and 30% succulents. Maintaining or exceeding a vegetative canopy cover of 15% is appropriate for this site and can provide cover for wildlife and soil site stability. The ecological site guide shows the potential for perennial grass to make up 10-15% of the annual production on the site. The potential for perennial grass is low on this site. Maintaining ≥1% perennial grass composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet calls for a bare ground cover class from 10-60% and a cryptogram cover class from 10-15%. Maintaining the midpoint or less of the bare ground cover class at 35% and a cryptogram cover of ≥10% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Coyote Flat #2 Allotment

Coyote Flat #2 Key Area 1:

Key Area 1, Limy Fan 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥10%
- Maintain a composition of perennial grass ≥1%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a cryptogram cover of ≥10%
- Maintain a bare ground cover of ≤35%

Rationale: This Key Area is located at an elevation of 1500 feet. It is approximately 0.75 miles southwest of the unfenced Rasmussen & Greer reservoir.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees and 30% succulents. The ecological site guide shows the potential for perennial grass to make up 10-15% of the annual production on the site. Maintaining or exceeding a vegetative canopy cover of 10% is appropriate for this site and can provide cover for wildlife and soil site stability. The potential for perennial grass is low on this site. Maintaining ≥1% perennial grass composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet calls for a bare ground cover class from 10-60% and a cryptogram cover class from 10-15%. Maintaining the midpoint or less of the bare ground cover class at 35% and a cryptogram cover of ≥10% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Coyote Flat #2 Key Area 3:

Key Area 3, Limy Fan 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥10%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a cryptogram cover of ≥10%
- Maintain a bare ground cover of ≤ 60%

Rationale:

This Key Area is at an elevation of approximately 1754 feet and approximately 1.7 miles southwest of Papago Well.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees and 30% succulents. Maintaining or exceeding a vegetative canopy cover of 10% is appropriate for this site and can provide cover for wildlife and soil site stability. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet calls for a bare ground cover class from 10-60% and a cryptogram cover class from 10-15%. Maintaining the maximum or less of the bare ground cover class at 60% and a cryptogram cover of ≥10% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Coyote Flat #2 Key Area 4:

Key Area 4, Sandy Wash 7-10" precipitation zone ecological site

- Maintain vegetative canopy cover at ≥70%
- Maintain a tree composition of ≥10%
- Maintain a composition of perennial grass ≥1%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a Bare Ground cover class of ≤15%

Rationale: This Key Area is located at an elevation of 1739 feet. It is within an ephemeral wash and approximately 1.8 miles southwest of Papago Well.

Rationale for DPC objectives is taken from the NRCS Sandy Wash 7-10" p.z. reference sheet (R040XB216AZ). The reference sheet shows a foliar cover of 60-70%, of which 10-30% is perennial grass, 40% is shrubs, 10% is subshrubs, 10% is perennial forbs, and 5-10% trees. The steepness of this wash site's banks limits the establishment of shallow rooted plant species and promotes a tree dominated state. Maintaining or exceeding a vegetative canopy cover of 70% and a maintaining or exceeding a tree composition of 10% can provide cover for wildlife and erosion control appropriate to this site. The potential for perennial grass is low on this site. Maintaining ≥1% perennial grass composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet shows a bare ground cover class of 15-40%. Maintaining the minimum or less of the bare ground cover class at 15% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Coyote Flat #2 Key Area 5:

Key Area 4, Limy Fan 7-10" precipitation zone ecological site

- Maintain vegetative canopy cover at ≥15%
- Maintain a composition of perennial grass ≥1%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a Bare Ground cover class of ≤60%

Rationale: This Key Area is situated at an elevation of 1628 feet and located approximately 0.8 mile from Kater Reservoir and approximately 1.2 miles from Little Eberling Tank.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees and 30% succulents. Maintaining or exceeding a vegetative canopy cover of 15% is appropriate for this site and can provide cover for wildlife and soil site stability. The ecological site guide shows the potential for perennial grass to make up 10-15% of the annual production on the site. The potential for perennial grass is low on this site. Maintaining ≥1% perennial grass composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet calls for a bare ground cover class from 10-60%. Maintaining the maximum or less of the bare ground cover class at 60% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Sentinel Allotment

Sentinel Key Area 1:

Key Area 1, Basalt Hills 3-7" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥1%
- Maintain a density of noxious species ≤1 plants per acre
- Maintain a bare ground cover of ≤5%

Rationale: This Key Area is located at an elevation of 613 feet. It is approximately 1.25 miles southeast of North Well and 1.25 miles north of State Well.

The rationale for DPC objectives is taken from the NRCS Basalt Hills 7-10" p.z. reference sheet (R040XB201AZ). However, this site receives much less precipitation and run-on moisture than the 7-10" precipitation zone. The reference sheet shows a canopy cover of 10-15% with a composition of 70-80% shrubs, 5% trees and 10-15% succulents. This is a naturally barren site on volcanic parent material with limy soils, very limited run-on moisture, and very limited infiltration potential or potential to sustain perennial species. Due to this site's barrenness and rockiness, it is seldom used by livestock or wildlife. Maintaining or exceeding a vegetative canopy cover of ≥1% is appropriate for this site and can provide soil site stability. The ESD indicates some presence of noxious/invasive species. Maintaining ≤ 1 noxious/invasive species per acre is appropriate for this site. The reference sheet calls for a bare ground cover class from 1-5%. This site has naturally high surface gravel and rock. Maintaining bare ground cover class of ≤5% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Sentinel Key Area 2:

Key Area 2, Sandy Wash 3-7" precipitation zone ecological site

- Maintain vegetative canopy cover at ≥50%.
- Maintain a composition of perennial grass ≥10%
- Maintain a composition of noxious species ≤1%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a Bare Ground cover class of ≤40%

Rationale: This Key Area is located at an elevation of 577 feet. It is approximately 0.7 miles west of State Well.

Rationale for DPC objectives is taken from the NRCS Sandy Wash 3-7" p.z. reference sheet (R040XC318AZ). However, this is a proto wash that has not developed completely into a wash as described in the ESD. The reference sheet shows a canopy cover of 60-70%, of which 10-30% is perennial grass, 40% shrubs, 10% subshrubs, 10% perennial forbs, and 5-10% trees. Maintaining or exceeding a vegetative canopy cover of 50% is appropriate for this site and can provide cover for wildlife and soil site stability. The ESD shows a perennial grass composition of 10-30%. Maintaining or exceeding a perennial grass composition of 10% is appropriate for this site. The reference sheet shows the potential for noxious/invasive species to be present. However, limiting noxious weeds to 1% or less of the total species composition should prevent the alteration of ecological site dynamics of the site. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet shows a bare ground cover class of 15-40%. Maintaining the maximum or less of the bare ground cover class at 40% is appropriate to this site and would be expected to prevent accelerated erosion of the site.

Sentinel Key Area 3:

Key Area 3, Limy Fan 3-7" precipitation zone ecological site

- Maintain vegetative canopy cover at ≥10%
- Maintain a composition of perennial grass ≥30%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a Bare Ground cover class of ≤60%

Rationale: This Key Area is situated at an elevation of 605 feet and is located approximately 1.1 miles north east of South Stanwix Pipeline Trough.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees and 30% succulents. Maintaining or exceeding a vegetative canopy cover of 10% is appropriate for this site and can provide cover for wildlife and soil site stability. The ecological site guide shows the potential for perennial grass to make up 10-15% of the annual production on the site. This site has coarser sandy soils that allow for increased infiltration and increase the potential for perennial grass. Maintaining ≥30% perennial grass composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining ≥5% desirable palatable browse is appropriate for this site. The reference sheet calls for a bare ground cover class from 10-60%. Maintaining the maximum or less of the bare ground cover class at 60% appropriate to this site and would be expected to prevent accelerated erosion of the site.

Sentinel Key Area 4:

Key Area 4, Limy Upland 7-10" precipitation zone ecological site

- Maintain vegetative canopy cover at ≥20%.
- Maintain a perennial grass composition ≥ 30%
- Maintain a composition of desirable palatable species ≥5%
- Maintain a Bare Ground cover class of ≤35%

Rationale: This Key Area is located at an elevation of 663 feet. It is located approximately 0.7 miles southeast of North Stanwix Pipeline Trough.

Rationale for DPC objectives is taken from NRCS Limy Upland 7-10" p.z. reference sheet (R040XB210AZ). The reference sheet shows a canopy cover of 20-25% with a composition of 50% shrubs, 20% trees, and 30% succulents. Maintaining or exceeding a vegetative canopy cover of ≥20% is appropriate for this site. The ESD shows the potential for perennial grass to comprise up to 9.5% of the vegetation community. Maintaining ≥30% perennial grass by composition is appropriate for this site. The ESD indicates little usable browse for livestock. Maintaining or exceeding 5% desirable palatable browse is appropriate for this site. The reference sheet shows bare ground to be between 10-60% with low values in high gravel cover areas and/or El Nino years. Maintaining the midpoint or less of the bare ground at 35% is appropriate to this site and would be expected to prevent accelerated erosion on this naturally bare site.

5.0 Inventory and Monitoring Data

5.1 Rangeland Survey Data

Rangeland Inventory was completed on the Ajo/Sentinel Complex between 2016 and 2019. 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".

5.2 Methods

Standard 1 – Upland Health was assessed using an Evaluation Matrix included in the *Interpreting Indicators of Rangeland Health handbook* (BLM Technical Reference 1734-6). The Evaluation Matrix includes five descriptions for each of the 17 indicators which reflects a range of departure from what is expected for the site per the reference sheet, with "none to slight" being the least departure and "extreme to total" being the most.

Standard 3 – Desired Resource Conditions were assessed using ground cover and species composition measurements. Two methods were used to calculate ground cover and species composition. Line intercept/belt density transects were used for upland sites comprised primarily of sparse shrubs such as limy uplands. Pace frequency/dry weight rank (DWR) transects were used for sites with more dense vegetation such as sandy washes. Ground cover describes the proportion of the soil surface covered by some type of protective material, which includes litter, live vegetation, rock, gravel, cryptograms, or bare ground. Ground cover was collected using points along a tape for line intercept/belt density transects and points in a quadrat for pace frequency/DWR transects. Species composition refers to the contribution of each plant species to the vegetation community at the site. Depending on the site, vegetation cover or DWR was used to calculate species composition. For line intercept transects vegetation cover was used to calculate species composition. Vegetation cover is the percentage of ground obscured by vegetation canopy for each species. For pace frequency transects DWR was used to calculate species composition. For DWR each species within a 40x40 cm frame are given a rank of 1, 2, or 3 corresponding to the amount of the current year's production. These ranks are then converted into composition. Using the following equations cover and DWR are converted to species composition:

$$\text{Species Composition of Species A} = \frac{\text{Species A Total Cover}}{\text{Total Cover for All Species}} \text{ X } 100$$

$$\text{Species Composition of Species A} = \frac{\text{Sum of Species A DWR}}{\text{Sum of All Species DWR}} \times 100$$

For line intercept transects density was also measured by walking along the transect tape while holding a two meter pole and counting any perennial plant rooted within the two meters.

6.0 Management Evaluation and Summary of Studies Data

6.1 Actual Use

Actual Use reporting is not required on any of the allotments in the Ajo/Sentinel Complex. Actual Use reports are turned in on a voluntary basis. Where these reports are unavailable, billing was used to calculate actual use. These allotments are all classified as perennial/ephemeral and may show AUMs higher than authorized on the permit due to ephemeral increases.

6.1.1 Cameron

Kind	Grazing Begin	Period End	%PL	AUM"s
Cattle	3/1/2018	2/28/2019	68	0
Cattle	3/1/2017	2/28//2018	68	0
Cattle	3/1/2016	2/28/2017	68	0
Cattle	3/1/2015	2/28/2016	68	0
Cattle	3/1/2014	2/28/2015	68	0
Cattle	3/1/2013	2/29/2014	68	0
Cattle	3/1/2012	2/28/2013	68	0
Cattle	3/1/2011	2/28/2012	68	0
Cattle	3/1/2010	2/28/2011	68	0
Cattle	3/1/2009	2/29/2010	68	0
Cattle	3/1/2008	2/28/2009	68	0
Cattle	3/1/2007	2/28/2008	68	0
Cattle	3/1/2006	6/15/2007	68	0
Cattle	1/15/2005	2/28/2006	68	0

6.1.2 Childs

Kind	Grazing Begin	Period End	%PL	AUM"s
Cattle	3/1/2020	2/28/2021	99	1307
Cattle	3/1/2019	2/28/2020	99	1307
Cattle	3/1/2018	2/28/2019	99	1247
Cattle	3/1/2017	2/28//2018	99	1188
Cattle	3/1/2016	2/28/2017	99	1307
Cattle	3/1/2015	2/28/2016	99	1307

Cattle	3/1/2014	2/28/2015	99	1188
Cattle	3/1/2013	2/28/2014	99	772
Cattle	3/1/2012	2/29/2013	99	772
Cattle	3/1/2011	2/28/2012	99	772
Cattle	3/1/2010	2/28/2011	99	772
Cattle	3/1/2009	2/28/2010	99	772
Cattle	3/1/2008	2/29/2009	99	772
Cattle	3/1/2007	2/28/2008	99	772
Cattle	3/1/2006	2/28/2007	99	772
Cattle	3/1/2005	2/28/2006	99	772

6.1.3 Coyote Flat #2

Kind	Grazing Begin	Period End	%PL	AUM"s
Cattle	3/1/2018	2/28/2019	97	361
Cattle	3/1/2017	10/07/2018	97	361
Cattle	3/1/2016	2/28/2017	97	361
Cattle	4/7/2015	4/30/2016	97	361
Cattle	3/21/2014	5/30/2015	97	361
Cattle	3/28/2013	2/28/2014	97	361
Cattle	3/1/2012	2/28/2013	97	361
Cattle	5/14/2011	9/5/2012	97	361
Cattle	3/1/2010	2/28/2011	97	361
Cattle	3/1/2009	2/28/2010	97	361
Cattle	3/1/2008	2/28/2009	100	96
Cattle	3/1/2007	2/28/2008	97	361
Cattle	3/1/2006	2/28/2007	95	182
Cattle	3/1/2005	2/28/2006	95	125

6.1.4 Sentinel

Kind	Grazing Begin	Period End	%PL	AUM"s
Cattle	3/1/2018	9/30/2019	92	708
Cattle	5/15/2017	2/28/2018	92	242
Cattle	4/4/2016	2/28/2017	92	461
Cattle	3/1/2015	2/28/2016	92	353
Cattle	3/1/2014	2/28/2015	92	0
Cattle	3/1/2013	2/28/2014	92	0
Cattle	3/1/2012	2/28/2013	92	0

Cattle	3/1/2011	2/28/2014	92	0
Cattle	3/1/2010	2/28/2011	92	0
Cattle	3/1/2009	2/28/2010	92	0
Cattle	3/1/2008	2/28/2009	92	0
Cattle	3/1/2007	2/28/2008	92	0
Cattle	3/1/2006	2/28/2007	92	0
Cattle	3/1/2005	2/28/2006	92	0

7.0 Conclusions

7.1 Upland Health Conclusions

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

Allotment	Key Area	Standard 1	Standard 3
Cameron	KA1	Achieved	Achieved
	KA2	Not achieved	Achieved
	KA3	Achieved	Achieved
	KA4	Achieved	Achieved
	KA5	Achieved	Achieved
Childs	KA1	Not achieved	Achieved
	KA2	Achieved	Not Achieved
	KA3	Achieved	Achieved
	KA4	Not achieved	Not Achieved
Coyote Flat #2	KA1	Achieved	Achieved
	KA2	Abandoned	Abandoned
	KA3	Achieved	Not Achieved
	KA4	Not Achieved	Achieved
	KA5	Not Achieved	Not Achieved
Sentinel	KA1	Achieved	Achieved
	KA2	Not Achieved	Achieved
	KA3	Achieved	Achieved
	KA4	Achieved	Achieved

Upland Health Conclusions are based on the analysis of the current monitoring data for each Key Area. The analysis of Standard 3 is based on Dry Weight Rank, Density, Line Intercept, and/or Point Cover study methods. Vegetative canopy cover and bare ground cover results are based on point cover data.

Utilization data and observations of livestock sign and impacts are used to determine if livestock are a potential causal factor for non-achievement of Standards. Based on Holechek (1988), livestock utilization levels in this precipitation zone should be between 30-40% for moderate use without producing deleterious effects to the ecological site. Based on Heffelfinger (2006) and a Biological Assessment and Biological Opinion between the BLM and the United States Fish and Wildlife Service, browse utilization in this precipitation zone should be limited to 30% to prevent deleterious effects to deer and Sonoran pronghorn habitat. Observations of livestock sign such as

trails, scat, and loitering areas are also taken into account when determining if livestock are the causal factor for non-achievement of Standards.

7.1.1 Cameron Allotment

Key Area 1
Standard 1: 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, Hydrologic Function and Biotic Integrity ratings are all categorized as a None to Slight departure from the reference state. Reference Section 1.1.1 of Appendix A.

Standard 3: Achieved

- Maintain a vegetative canopy cover of ≥20% — ACHIEVED
- Maintain a composition of desirable palatable species ≥5% — NOT ACHIEVED
- Maintain a bare ground cover of ≤10% — ACHIEVED

Rationale:
The vegetative canopy cover objective is achieved on this site, with a vegetative canopy cover of 30.6%. The desirable palatable species objective is not achieved with a composition of 1.67%. The Bare Ground cover class objective is achieved on the site, with a bare ground cover class of 2.73%.

No use was observed or recorded for this site. No livestock sign was observed on site.

Key Area 2
Standard 1: Upland Site does Not Achieve Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are evident due to gully formation. The indicator soil surface loss or degradation deviates Extremely to Total, the indicators gullies and compaction layer deviate Moderate to Extremely, and the indicators wind-scoured/ blowouts and deposition areas and plant mortality/decadence deviate Moderately. This results in Soil and Site Stability being classified as a Moderate to Extreme departure, Hydrologic Function being classified as Moderate departure and Biotic Integrity being classified as a Slight to Moderate departure from the reference state. Reference Section 1.1.2 of Appendix A.

Standard 3: Achieved

- Maintain a vegetative canopy cover of ≥15% — ACHIEVED
- Maintain a composition of perennial grass ≥1% — ACHIEVED
- Maintain a cryptogam cover of ≥ 10% — NOT ACHIEVED
- Maintain a bare ground cover of ≤60% — ACHIEVED

Rationale:

The vegetative canopy cover objective is met, with a vegetative canopy cover of 21%. Perennial grass composition was recorded at 2.54% and achieves the objective. Cryptogam cover is 2% and does not achieve the objective. The Bare Ground objective is achieved with a bare ground cover of 57.5%.

Utilization data from 2016 for this Key Area shows a use of bush muhly to be 2.5%. Some sign of feral burros in the form of scat and tracks were observed on site. However, excessive erosion stemming from OHV routes and tracks to the east of the plot are contributing to the erosion of the site.

Key Area 3
Standard 1: 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. However, some indicators departed from reference conditions; the indicators gullies, litter movement, functional/ structural groups and plant mortality/ decadence all departed Slight to Moderately. This results in Soil and Site Stability, Hydrologic Function and Biotic Integrity ratings are all categorized as a None to Slight departure from the reference state. Reference Section 1.1.3 of Appendix A.

Standard 3: Achieved

- Maintain a vegetative canopy cover of ≥15% — ACHIEVED
- Maintain a cryptogam cover of ≥ 10% — ACHIEVED
- Maintain a bare ground cover of ≤60% — ACHIEVED

Rationale:
The vegetative canopy cover objective for this site is achieved, with a vegetative canopy cover of 24%. The cryptogam cover objective is achieved, with a cryptogam cover of 12%. The bare ground cover objective is achieved, with a bare ground cover of 39.5%.

There are no palatable species are present on this site.

Key Area 4
Standard 1: 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. However, some indicators departed from reference conditions; the indicators soil surface loss or degradation, plant mortality/ decadence, and invasive plants all departed Slight to Moderately. This results in Soil and Site Stability and Hydrologic Function being classified as a None to Slight departure from the reference state and Biotic Integrity being classified as a Slight to Moderate departure from the reference state. Reference Section 1.1.4 of Appendix A.

Standard 3: Achieved

- Maintain a tree composition of ≥10% ACHIEVED
- Maintain vegetative canopy cover at ≥70%. ACHIEVED
- Maintain a Bare Ground cover class of ≤15% ACHIEVED

Rationale:
The objective for the percent tree composition is achieved, with a composition of 89.38%. The vegetative canopy cover objective for this site is achieved, with a vegetative canopy cover of 75.49%. The bare ground objective is achieved, with a bare ground cover of 1.96%.

Utilization data from 2016 for this Key Area shows a use of palo verde to be 2.5%.

Key Area 5
Standard 1: 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, Hydrologic Function and Biotic Integrity ratings are all categorized as a None to Slight departure from the reference state. Reference Section 1.1.5 of Appendix A.

Standard 3: Achieved

- Maintain a vegetative canopy cover of ≥10% ACHIEVED
- Maintain a cryptogam cover of ≥ 10% ACHIEVED
- Maintain a bare ground cover of ≤35% ACHIEVED

Rationale:
The vegetative canopy cover objective for this site is achieved, with a vegetative canopy cover of 13.5%. The cryptogam cover objective is achieved, with a cryptogam cover of 13%. The bare ground objective is achieved, with a bare ground cover of 33.5%.

Utilization data from 2016 for this Key Area shows a use of burrobush to be 2.5%.

7.1.2 Childs Allotment

Key Area 1
Standard 1: Upland Site does Not Achieve Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

The indicators soil surface resistance to erosion and soil surface loss or degradation both depart Extremely to Total. The indicators rills and pedestals and/ or terrecettes both departed Moderate to Extremely. The indicators plant mortality/ decadence and reproductive capability of perennial plants both departed Moderately. This results in Soil and Site Stability and Hydrologic Function being classified as a Moderate to Extreme departure and Biotic Integrity being classified as a Moderate departure from the reference state. Reference Section 1.2.1 of Appendix A.

Standard 3: Achieved

- Maintain vegetative canopy cover at ≥ 6%. ACHIEVED
- Maintain a perennial grass composition of ≥9% NOT ACHIEVED
- Maintain a composition of desirable palatable species ≥5% ACHIEVED
- Maintain a Bare Ground cover class of ≤35% ACHIEVED

Rationale:
The vegetative canopy cover objective is achieved on this site, with a vegetative canopy cover of 11%. Perennial grass accounts for 2.76% of total plant community composition and fails to achieve the objective. The desirable palatable species objective is achieved with a composition of 22.61%. The Bare Ground cover class objective is achieved, with a bare ground cover class of 21%.

Between 2016 and 2021 vegetative canopy cover increased from 8% to 11%, perennial grass composition decreased from 9.41% to 2.76%, desirable palatable species decreased from 26.41% to 22.61% and bare ground decreased from 21.5% to 21%.

Utilization data from 2016 for this Key Area shows a use of big galleta grass to be 35%. Utilization data from 2021 for this Key Area shows a use of big galleta grass to be 33.3%, white bursage to be 5.7%, and ratany to be 11.6%. The reduction in use of big galleta between 2016 and 2021 is likely due to the movement of feral burros out of the area. However, livestock grazing is likely a contributing factor towards the non-achievement of Standard 1 on this site.

Key Area 2
Standard 1: Upland Site Achieves Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

The indicator water-flow patterns departed Slight to Moderate. Soil surface loss and degradation is evident which resulted in a Moderate departure. The indicators reproductive capability of perennial plants and plant mortality and decadence departed Moderately. This results in Soil and Site Stability and Hydrologic Function being classified as a Slight to Moderate departure and Biotic Integrity being classified as a Moderate departure from the reference state. Reference Section 1.2.2 of Appendix A.

Standard 3: Not Achieved

- Maintain a vegetative canopy cover of ≥15% NOT ACHIEVED
- Maintain a perennial grass composition of ≥17% NOT ACHIEVED
- Maintain a composition of desirable palatable species ≥5% ACHIEVED
- Maintain a Bare Ground cover class of ≤35% NOT ACHIEVED

Rationale:
Vegetative canopy cover objective is not achieved on the site, with a vegetative canopy cover of 11.5%. Perennial grass accounts for 8.74% of total plant community composition and does not achieve the objective. The desirable palatable species objective is achieved with a composition of 17.34%. The Bare Ground cover class objective is not achieved on the site, with a bare ground cover class of 41%.

Utilization data from 2016 for this Key Area shows a use of big galleta grass to be 9.5%. Utilization data from 2021 for this Key Area shows a use of big galleta grass to be 12.1%, ratany to be 11.3%, and white bursage to be 2.5%. Both cattle and burro sign were observed on this site. Despite the low use, a substantial amount of feral burro sign was observed on site. It is unlikely that cattle grazing is the causal factor for the non-achievement of Standard 3 on this site.

Key Area 3

Standard 1: Upland Site Achieves Standard

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

The indicators soil surface resistance to erosion and reproductive capability of perennial plants both departed Moderate to Extremely. The indicator plant mortality and decadence departed Moderately. This results in Soil and Site Stability and Hydrologic Function being classified as a Slight to Moderate departure and Biotic Integrity being classified as a Moderate departure from the reference state. Reference Section 1.2.3 of Appendix A.

Standard 3: Achieved

- Maintain vegetative canopy cover at ≥20%. ACHIEVED
- Maintain a perennial grass composition ≥ 9.5% ACHIEVED
- Maintain a composition of desirable palatable species ≥5% ACHIEVED
- Maintain a Bare Ground cover class of ≤35% ACHIEVED

Rationale:

The vegetative canopy cover objective is achieved, with a vegetative canopy cover of 22.5%. Perennial grass accounts for 33.74% of total plant community composition and achieves the objective. The desirable palatable species objective is achieved with a composition of 41.59%. The Bare Ground cover class objective is achieved on the site, with a bare ground cover class of 18.5%.

Utilization data from 2016 for this Key Area shows use of bush muhly to be 50.66% and use of ratany to be 37.9%. A large amount of trespass cattle and feral burro sign was observed on site. This is the likely cause for the high level of utilization of desirable palatable species on the site.

Key Area 4

Standard 1: Upland Site does Not Achieve Standard

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

The indicator plant mortality/decadence departed Extreme to Total. The indicators compaction layer and reproductive capability of perennial plants both departed Moderate to Extremely. The indicators rills and soil surface loss or degradation both departed Moderately. The indicators pedestals and/ or terrecettes and wild-scoured, blowouts, and/or deposition areas both departed Slight to Moderately. This resulted in Soil and Site Stability and Hydrologic Function to being

classified as a Moderate departure and Biotic Integrity being classified as a Moderate to Extreme departure from reference state conditions. Reference Section 1.2.4 of Appendix A.

Standard 3: Not Achieved

- Maintain a vegetative canopy cover of ≥15% ACHIEVED
- Maintain a composition of perennial grass ≥1% NOT ACHIEVED
- Maintain a composition of desirable palatable species ≥5% NOT ACHIEVED
- Maintain a cryptogam cover of ≥ 10% NOT ACHIEVED
- Maintain a Bare Ground cover class of ≤35% ACHIEVED

Rationale:
The vegetative canopy cover objective is achieved with canopy cover of 15%. Perennial grass accounts for 0% of total plant community composition on this site and does not achieve the objective. The desirable palatable species objective is not achieved with a composition of 1.11%. The cryptogam cover class objective on this site is not achieved, with a cryptogam cover of 1%. The Bare Ground cover class objective is achieved, with a bare ground cover class of 11.5%.

Utilization data from 2016 show use of big galleta at 35.7% and white bursage at 10.8%. Cattle and feral burro sign was observed on site in 2016.

Utilization data from 2021 shows use of white bursage at 30.5% and big galleta at 29.1%. Cattle sign was observed on site and are likely a contributing factor towards the non-achievement of Standard 1 and3.

7.1.3 Coyote Flat #2 Allotment

Key Area 1

Standard 1: 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. However, the indicators soils surface loss or degradation and plant mortality/decadence both departed Slight to Moderately. This results in Soil and Site Stability and Hydrologic Function being classified as None to Slight and Biotic Integrity being classified as a Slight to Moderate departure from the reference state. Reference Section 1.3.1 of Appendix A.

Standard 3: Achieved

- Maintain a vegetative canopy cover of ≥10% NOT ACHIEVED
- Maintain a composition of perennial grass ≥1% ACHIEVED
- Maintain a composition of desirable palatable species ≥5% ACHIEVED
- Maintain a cryptogram cover of ≥10% NOT ACHIEVED
- Maintain a bare ground cover of ≤35% ACHIEVED

Rationale:

The vegetative canopy cover objective is not achieved, with a vegetative canopy cover of 7.5%. Perennial grass accounts for 7.55% of the total composition of the plant community and achieves the objective. Desirable palatable species objective is achieved with a composition of 7.55% of the vegetation community. The cryptogam cover class objective is not achieved, with a cryptogam cover of 0%. The Bare Ground cover class objective is achieved, with a bare ground cover of 32%.

Utilization data from 2016 for this Key Area shows a use of big galleta to be 22.77%. This is a naturally barren site that receives little run-on moisture.

Utilization data from 2021 for this Key Area shows a use of big galleta to be 17.2% and use of white bursage to be 5%.

Key Area 2
Site Abandoned.

Key Area 3
Standard 1: Upland Site Achieves Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

The indicator pedestals and/ or terrecettes departed Slight to Moderately and the indicator compaction layer departed Moderate due to OHV use. This resulted in Soil and Site Stability and Hydrologic Function to be classified as a Slight to Moderate departure. The indicator functional structural groups departed Moderate to Extremely due to low species diversity resulting in Biotic Integrity to be classified as a Moderate departure from reference state conditions. Reference Section 1.3.2 of Appendix A.

Standard 3: Not Achieved

- Maintain a vegetative canopy cover of ≥10% NOT ACHIEVED
- Maintain a composition of desirable palatable species ≥5% NOT ACHIEVED
- Maintain a cryptogram cover of ≥10% NOT ACHIEVED
- Maintain a bare ground cover of ≤ 60% ACHIEVED

Rationale:
The vegetative canopy cover objective is not achieved, with a vegetative canopy cover of 5%. The desirable palatable species objective is not achieved, with a composition of 0%. The cryptogam cover class objective is not achieved, with a cryptogam cover of 1.5%. The bare ground cover class objective is achieved, with a bare ground cover of 39%.

There are no desirable palatable species on this site. This is a naturally bare site with limited run-on moisture. Cattle sign in the form of trails and scat was observed on the site. Dispersed camping stemming from the Gunsight Wash camping area as well as OHV use are common in this area. It is unlikely that livestock grazing is the causal factor for the non-achievement of Standard 3.

Key Area 4
Standard 1: Upland Site does Not Achieve Standard

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

The indicator rills depart Extremely to Total. The indicator soils surface loss or degradation departs Moderate to Extremely. The indicator soils surface resistance to erosion departs Moderately. The indicator reproductive capability of perennial plants departs Slight to Moderately. This resulted in Soil and Site Stability, Hydrologic Function, and Biotic Integrity being classified as a Moderate departure from reference state conditions. Reference Section 1.3.3 of Appendix A.

Standard 3: Achieved

- Maintain vegetative canopy cover at ≥70% ACHIEVED
- Maintain a tree composition of ≥10% ACHIEVED
- Maintain a composition of perennial grass ≥1% NOT ACHIEVED
- Maintain a composition of desirable palatable species ≥5% NOT ACHIEVED
- Maintain a Bare Ground cover class of ≤15% ACHIEVED

Rationale:
The vegetative canopy cover objective is achieved, with a canopy cover of 70.00%. The objective for the percent composition of trees in the plant community is achieved, with a percent tree composition of 61.76%. Perennial grass accounts for 0.82% of the vegetation community and does not achieve the objective. The desirable palatable species objective is not achieved with a composition of 0.82%. The bare ground objective is achieved, with a bare ground cover of 11%.

Utilization data from 2016 and 2021 for this Key Area shows use of palo verde at 9.5% and 17.1%, respectively. This is within an acceptable range of utilization. The lack of desirable palatable species on site is limited due to the channelized form of the wash. A large number of OHV tracks and some cattle sign in the form of trails and scat were observed. A large dispersed camping area is within a mile to the southeast of this site contributing to the recreational impacts observed on site. It is unlikely that livestock grazing is the causal factor for any non-achievement of DPC objectives on site.

Key Area 5
Standard 1: Upland Site does Not Achieve Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

The indicator soil surface loss or degradation departed Moderate to Extremely. The indicators rills, plant mortality/ decadence, and gullies all departed Moderately. The indicators water-flow patterns, blowouts, and / or deposition areas, functional/ structural groups, and reproductive capability of perennial plants all departed Slight to Moderately. This resulted in Soil and Site Stability, Hydrologic Function, and Biotic Integrity being classified as a Moderate departure from reference state conditions. Reference Section 1.3.4 of Appendix A.

Standard 3: Not Achieved

- Maintain vegetative canopy cover at ≥15% ACHIEVED
- Maintain a composition of perennial grass ≥1% NOT ACHIEVED

- Maintain a composition of desirable palatable species ≥5% NOT ACHIEVED
- Maintain a Bare Ground cover class of ≤60% ACHIEVED

Rationale:
The vegetative canopy cover objective is achieved, with a vegetative canopy cover of 22.5%. Perennial grass accounts for 0.67% of the vegetation community and does not achieve the objective. The desirable palatable species objective is not achieved with a composition of 0.67%. The bare ground objective is achieved, with a bare ground cover of 31.5%.

Utilization data of bush muhly from 2018 and 2021 shows a use of less than 2.5% and 7.1%, respectively. Very little livestock sign was observed on site. A road to the south of the plot is providing accelerated runoff and evidence of wood cutting was observed in the area. It is unlikely that livestock grazing is the causal factor for the non-achievement of Standards on this site.

7.1.4 Sentinel Allotment

Key Area 1
Standard 1: 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. This results in Soil and Site Stability and Hydrologic Function being classified as a None to Slight departure. There were some noxious/invasive species present resulting in Biotic Integrity being classified as a Slight to Moderate departure from the reference state. Reference Section 1.3.1 of Appendix A.

Standard 3: Achieved
- Maintain a vegetative canopy cover of ≥1% ACHIEVED
- Maintain a density of noxious species ≤1 plants per acre NOT ACHIEVED
- Maintain a bare ground cover of ≤5% ACHIEVED

Rational:
The vegetative canopy cover objective is achieved, with a vegetative canopy cover of 3%. The density of noxious species objective is not achieved, with a density of noxious species of 6.64 plants per acre. The bare ground objective is achieved, with a bare ground cover of 4%.

There are no palatable species present on this site. This is a naturally bare site with limited run-on moisture or potential to produce palatable species. No cattle sign was observed on the site in 2014 or 2019.

Key Area 2
Standard 1: Upland Site Does Not Achieve Standard
Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion and an increasing amount of invasive plant species are present and inconsistent with the site reference state. This results in Soil and Site Stability, Hydrologic Function, and Biotic Integrity being classified as a Moderate departure from the reference state. Reference Section 1.3.1 of Appendix A.

Standard 3: Achieved

- Maintain vegetative canopy cover at ≥50%. ACHIEVED
- Maintain a composition of perennial grass ≥10% NOT ACHIEVED
- Maintain a composition of noxious species ≤1% ACHIEVED
- Maintain a composition of desirable palatable species ≥5% ACHIEVED
- Maintain a Bare Ground cover class of ≤40% ACHIEVED

Rational:
The vegetative canopy cover objective is achieved, with a vegetative canopy cover of 50%. The composition of perennial grass is not achieved, with a composition of 5.89%. The composition of noxious species objective is achieved, with a composition of noxious species of 0.55%. The desirable palatable species objective is achieved with a composition of 7.12%. The bare ground objective is achieved, with a bare ground cover of 40%.

Utilization data from 2019 shows a use of big galleta of 14.2% and ratany of 2.5%. It is unlikely that livestock utilization is the causal factor for the non-achievement of Standard 1. However, livestock presence and movement through the area may have contributed to the presence of noxious species and accelerated erosion on the site.

Key Area 3
Standard 1: 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. This results in Soil and Site Stability, Hydrologic Function, and Biotic Integrity being classified as a None to Slight departure reference Section 1.3.1 of Appendix A.

Standard 3: Achieved

- Maintain vegetative canopy cover at ≥10% NOT ACHIEVED
- Maintain a composition of perennial grass ≥30% ACHIEVED
- Maintain a composition of desirable palatable species ≥5% ACHIEVED
- Maintain a Bare Ground cover class of ≤60% ACHIEVED

Rational:
The vegetative canopy cover objective is not achieved, with a vegetative canopy cover of 7.7%. Perennial grass accounts for 37.8% of the vegetation community and achieves the objective. The desirable palatable species objective is achieved with a composition of 44.2%. The bare ground objective is achieved, with a bare ground cover of 43.7%.

Utilization data from 2019 shows a use of big galleta of 3.2%, burrobush of 3% and ratany of 2.5%. Utilization data from 2016 also shows low use of big galleta of 2.5% and ratany of 2.5%.

Key Area 4
Standard 1: 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. This results in Soil and Site Stability and Hydrologic Function being classified as a None to Slight departure. Some noxious/invasive species are present resulting in Biotic Integrity being classified as a Slight to Moderate departure from the reference state. Reference Section 1.3.1 of Appendix A.

Standard 3: Achieved

- Maintain vegetative canopy cover at ≥20%. ACHIEVED
- Maintain a perennial grass composition ≥ 30% ACHIEVED
- Maintain a composition of desirable palatable species ≥5% ACHIEVED
- Maintain a Bare Ground cover class of ≤35% ACHIEVED

Rational:
The vegetative canopy cover objective is achieved, with a vegetative canopy cover of 22%. Perennial grass counts for 31.5% of the vegetation community and achieves the objective. The desirable palatable species objective is achieved with a composition of 42.8%. The bare ground objective is achieved, with a bare ground cover of 34%.

Utilization data from 2019 shows a use of big galleta of 5% and ratany of 3.6%. Utilization data from 2016 shows a use of big galleta of 2.5% and ratany of 2.5%.

8.0 Recommended Management Actions

8.1 Recommended Management Actions for Uplands in the Complex

Based on the data presented in Section 7 of this document, the majority of the Complex is achieving Standards. It is recommended that the Cameron allotment remain unavailable for grazing and the Childs, Coyote Flat #2, and Sentinel allotments are issued 10 year grazing permits with changes in the mandatory terms and conditions. Changes in the mandatory terms and conditions are needed to reflect the conservation measures in the 2021 Biological and Conference Opinion for Sonoran pronghorn and acuña cactus. Other management actions for the areas not achieving either Standard 1 or Standard 3 are recommended to be implemented prior to the permits being issued.

8.1.1 Cameron Allotment

The Limy Fan ecological site is not achieving Standard 1 on the Cameron allotment. This is primarily due to gully formation and excessive soil loss stemming from OHV routes in the broad alluvial fans in the northeastern portion of the allotment. No cattle sign was observed on the site. However, sign of feral burros in the form of scat and tracks were present. It is recommended that the allotment remain closed livestock grazing, unnecessary OHV routes are closed, and existing

routes signed more clearly. Erosional control structures and/or materials should be installed to prevent further erosion of the site. Feral burros should also be managed according to state law to prevent future impacts from rising populations.

8.1.2 Childs Allotment

The Limy Upland Deep and Limy Fan ecological sites are not achieving Standard 1 and the Limy Fan and Sandy Loam Deep ecological sites are not achieving Standard 3 on the Childs allotment. The Limy Upland Deep ecological site is not achieving Standard 1 due to moderate to extreme departure of soil and site stability and hydrologic function which is primarily due to the excessive use of the site by feral burros. The Limy Fan ecological site is not achieving Standard 1 and 3 due to moderate departure of the soil and site stability, hydrologic function, and biotic integrity as well as low perennial grass and desirable palatable species composition and low cryptogam cover. Excessive feral burro and OHV use are the primary causal factors for the non-achievement of Standards on the Limy Fan ecological site. The Sandy Loam Deep ecological site is not achieving Standard 3 due to low perennial grass composition and excessive bare ground due to feral burro use of the site. It is recommended that feral burros are managed according to state law to prevent future impacts from the rising populations in the area.

8.1.3 Coyote Flat #2 Allotment

The Sandy Wash ecological site is not achieving Standard 1 and the Limy Fan ecological site is not achieving Standard 3 on the Coyote Flat allotment. The Sandy Wash ecological site not achieving Standard 1 due to a moderate departure of soil and site stability and hydrologic function. The primary causal factor for the non-achievement of Standard 1 is excessive OHV use in the area stemming from the dispersed camping at gunsite wash, to the southeast of the plot. The Limy Fan ecological site is not achieving Standard 3 due to the lack of perennial grass and desirable palatable species composition and cryptogam and vegetation canopy cover. The primary causal factors for the non-achievement of Standard 3 on the Limy Fan ecological site are erosion caused from OHV traffic and feral burros. It is recommended that unnecessary OHV routes are closed and existing routes signed more clearly. Erosional control structures and/or materials should be installed to prevent further erosion of the site. Feral burros should also be managed according to state law to prevent future impacts from rising populations.

8.1.4 Sentinel Allotment

The Sandy Wash ecological site is not achieving Standard 1 on the Sentinel allotment due to accelerated erosion and presence of invasive/noxious species. Invasive/noxious species are also present on other ecological sites within the allotment. Buffelgrass (*Cenchrus ciliaris*) and Sahara mustard (*Brassica tournefortii*) are the primary invaders of this allotment and should be treated to prevent further spread. It is recommended that mechanical (pulling and removal) noxious weed treatments are conducted on the Sentinel allotment.

To facilitate orderly management of the range, Actual Use reporting should be added to the terms and conditions of the permits. Some 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 Utilization data is collected.

9.0 List of Preparers

Name	Title
Doug Whitbeck	Rangeland Management Specialist
Michael Daehler	Wildlife Biologist
Chandler Schoch	Range Technician

10.0 References

Heffelfinger, J.R., et al. 2006. Habitat Guidelines for Mule Deer: Southwest Deserts Ecoregion. Mule Deer Working Group. Western Association of Fish and Wildlife Agencies.

Holechek, Jerry L. 1988. An Approach for Setting the Stocking Rate. Rangelands Volume 10(1):10-14. Denver, Colorado.

Oftedal, O.T. 2002. Nutritional Ecology of the Desert Tortoise in Mojave and Sonoran Deserts. Pp. 194-241 in T. R. Van Devender. ed. The Sonoran Desert Tortoise: Natural History, Biology, and Conservation. University of Arizona Press and The Arizona-Sonora Desert Museum, Tucson.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Technical Reference 4400. 1996. Sampling Vegetation Attributes. Interagency Technical Reference, Cooperative Extention Services. National Applied Resources Sciences Center. Bureau of Land Management. Denver, Colorado.

Technical Reference 1734-3. 1996. Utilization Studies and Residual Measurements. Interagency Technical Reference, Cooperative Extention Services. National Applied Resources Sciences Center. Bureau of Land Management. Denver, Colorado.

Technical Reference 1734-6. 2001. Interpreting Indicators of Rangeland Health. Natural Science and Technology Center, Bureau of Land Management. Denver, Colorado.

Technical Reference 1734-7. 2001. Ecological Site Inventory. Natural Science and Technology Center, Bureau of Land Management. Denver, Colorado.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

United States Department of Agriculture Natural Resources Conservation Service. 1997. Soil Survey of Gila Bend-Ajo Area, Arizona, Parts of Maricopa and Pima Counties.

United States Department of Agriculture Soil Conservation Service. 1977. Soil Survey of Maricopa County, Arizona.

Van Devender, T. R.,et al. 2002. Grasses, Mallows, Desert Vine, and More: Diet of the Desert Tortoise in Arizona and Sonora. Pp.159-193 in T. R. Van Devender. ed. The Sonoran Desert Tortoise: Natural History, Biology, and Conservation. University of Arizona Press and The Arizona-Sonora Desert Museum, Tucson.

Appendix A – Monitoring Data

Table of Contents

1.0 Key Area Data

1.1 Cameron Allotment

1.1.1 Key Area 1

Interpreting Indicators of Rangeland Health: 2015

Attribute Rating:	Rationale:
Soil and Site Stability (S): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site.
Hydrologic Function (H): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B): **NS**	None to Slight Departure. The indicators observed, 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	Veg. Canopy	Litter	Gravel/Stone	Cryptograms
2015	2.73%	30.60%	12.02%	54.1%	0.55%

Line Intercept and Density Data:

Plant Species KA1	Symbol	Cover (%)	Composition (%)	Density (Plants/Acre)
Tree and Shrub Species		**2015**	**2015**	**2015**
Acacia constricta	ACCO2	0.61	1.46	26.56
Ambrosia deltoidea	AMDE4	11.70	28.04	743.71
Calliandra eriophylla	CAER	1.08	2.59	139.45
Encelia farinosa	ENFA	-	-	19.92
Ephedra spp.	EPHED	-	-	6.64
Fouquieria splendens	FOSP2	0.39	0.93	19.92
Krameria grayi	KRGR	0.30	0.72	46.48
Larrea tridentata	LATR2	3.01	7.21	99.60
Lycium spp.	LYCIU	1.85	4.44	46.48
Olneya tesota	OLTE	6.69	16.04	46.48
Parkinsonia microphylla	PAMI5	13.88	33.27	112.88
Total		39.51	94.7	1308.12
Forbs- Perennial/Biennial				
Eriogonum inflatum	ERIN4	0.06	0.14	13.28
Euphorbia sp.	EUPHO	1.40	3.36	5803.57
Janusia gracilis	JAGR	0.34	0.82	19.92
Total		1.8	4.32	5836.77
Grasses				

Bothriochloa barbinodis var. perforata	BOBA3	-	-	106.24
Total		-	-	106.24
Succulents				
Carnegiea gigantea	CAGI10	-	-	26.56
Cylindropuntia leptocaulis	CYLE8	-	-	6.64
Cylindropuntia versicolor	CYVE3	0.25	0.60	86.32
Mammillaria spp.	MAMMI	-	-	6.64
Stenocereus thurberi	STTH3	0.06	0.14	6.64
Total		0.31	0.74	132.8
Unknown				
Unknown 1	UNKN1	0.10	0.24	33.20
Total		0.10	0.24	33.20

1.1.2 Key Area 2

Interpreting Indicators of Rangeland Health: 2016

Attribute Rating:	Rationale:
Soil and Site Stability (S): **ME**	Moderate to Extreme Departure. The indicator soil surface loss departed extremely to total. The indicators gullies and compaction layer departed moderate to extremely. The indicators litter movement and wind-scoured, blowouts, and deposition areas departed moderately.
Hydrologic Function (H): **M**	Moderate Departure. The indicator soil surface loss or degradation departed extremely to total. The indicators gullies and compaction layer departed moderate to extremely. The indicator plant community composition and distribution relative to infiltration departed slight to moderately.
Biotic Integrity (B): **SM**	Slight to Moderate Departure. The indicator soil surface loss or degradation departed extremely to total. The indicator plant mortality/ decadence departed moderately. The indicator compaction layer departed moderate to extremely.

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	Veg. Cover	Litter	Gravel/Stone	Cryptograms
2016	57.5%	21.0%	19.5%	0.0%	2.0%

Line Intercept and Density Data:

Plant Species KA2	Symbol	Cover (%)	Composition (%)	Density (Plants/Acre)
Tree and Shrub Species		**2016**	**2016**	**2016**
Larrea tridentata	LATR2	17.25	62.68	539.62
Lycium spp.	LYCIU	0.20	0.73	13.00
Prosopis velutina	PRVE	9.37	34.05	149.53

Total		26.82	97.46	702.15
Grasses				
Muhlenbergia porteri	MUPO2	0.70	2.54	26.01
Total		0.70	2.54	26.01
Succulents				
Cylindropuntia bigelovii	CYBI9	-	-	6.50
Cylindropuntia versicolor	CYVE3	-	-	6.50
Total		-	-	13.00

Utilization Data:

KA2 Utilization, 2016		
SPECIES	**SYMBOL**	**% USE**
Muhlenbergia porteri	MUPO2	2.5%

1.1.3 Key Area 3

Interpreting Indicators of Rangeland Health: 2016

Attribute Rating:	Rationale:
Soil and Site Stability (S): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site. With the exception of a slight to moderate departure for the indicators gullies and litter movement.
Hydrologic Function (H): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure for the indicator gullies.
Biotic Integrity (B): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure for the indicators functional/ structural groups and plant mortality/ decadence.

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**	**Veg. Canopy**	**Litter**	**Gravel/Stone**	**Cryptograms**
2016	39.5%	24.0%	23.0%	1.5%	12.0%

Line Intercept and Density Data:

Plant Species KA3	**Symbol**	**Cover (%)**	**Composition (%)**	**Density (Plants/Acre)**
Tree and Shrub Species		**2016**	**2016**	**2016**
Ambrosia dumosa	AMDU2	0.59	2.17	201.55
Larrea tridentata	LATR2	15.67	57.72	312.07
Lycium spp.	LYCIU	0.28	1.02	58.51
Prosopis velutina	PRVE	10.61	39.09	110.53

Total		27.15	100	682.66
Forbs- Perennial/Biennial				
Acourtia wrightii	ACWR5	-	-	6.50
Total		-	-	6.50

Utilization Data:

KA3 Utilization, 2016		
SPECIES	**SYMBOL**	**% USE**
No palatable species	-	-

1.1.4 Key Area 4

Interpreting Indicators of Rangeland Health: 2016

Attribute Rating:	Rationale:
Soil and Site Stability (S): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site. With the exception of a slight to moderate departure for the indicator soil surface loss or degradation.
Hydrologic Function (H): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site. With the exception of a slight to moderate departure for the indicator soil surface loss or degradation.
Biotic Integrity (B): **SM**	Slight to Moderate Departure. The indicators soil surface loss or degradation, plant mortality/ decadence, and invasive plants all depart slight to moderately.

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**	**Veg. Cover**	**Litter**	**Gravel/Stone**	**Cryptograms**
2016	1.96%	75.49%	22.55%	0.00%	0.00%

Frequency and Composition Data:

Plant Species KA4	**Symbol**	**Frequency (%)**	**Composition (%)**
Tree and Shrub Species		**2016**	**2016**
Acacia greggii	ACGR	11.76	12.64
Ambrosia ambrosioides	AMAM2	0.98	1.26
Castela emoryi	CAEM4	1.96	1.64
Larrea tridentata	LATR2	1.96	1.39
Lycium spp.	LYCIU	1.96	1.39
Parkinsonia florida	PAFL6	34.31	36.79
Prosopis velutina	PRVE	35.29	38.31
Total		88.22	93.42

Forbs- Perennial/Biennial			
Funastrum cynanchoides	FUCYC	0.98	0.13
Polycarpaea corymbosa	POCO30	16.67	6.32
Sphaeralcea ambigua	SPHAE	0.98	0.13
Total		18.63	6.58

Utilization Data:

KA4 Utilization, 2016		
SPECIES	**SYMBOL**	**% USE**
Parkinsonia microphylla	PAMI5	2.5

1.1.5 Key Area 5

Interpreting Indicators of Rangeland Health: 2016

Attribute Rating:	Rationale:
Soil and Site Stability (S): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site.
Hydrologic Function (H): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B): **NS**	None to Slight Departure. The indicators observed, 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	Veg. Canopy	Litter	Gravel/Stone	Cryptograms
2016	33.5%	13.5%	11.5%	28.5%	13.0%

Line Intercept and Density Data:

Plant Species KA5	Symbol	Cover (%)	Composition (%)	Density (Plants/Acre)
Tree and Shrub Species		**2016**	**2016**	**2016**
Ambrosia dumosa	AMDU2	0.88	7.07	851.70
Larrea tridentata	LATR2	10.37	83.29	266.56
Lycium spp.	LYCIU	0.05	0.40	26.01
Prosopis velutina	PRVE	1.15	9.24	6.50
Total		12.45	100	1150.77

Utilization Data:

KA5 Utilization, 2016		
SPECIES	**SYMBOL**	**% USE**
Ambrosia dumosa	AMDU2	2.5

1.2 Childs Allotment

1.2.1 Key Area 1

Interpreting Indicators of Rangeland Health: 2021

Attribute Rating:	Rationale:
Soil and Site Stability (S): **ME**	Moderate to Extreme Departure. The indicators soil surface resistance to erosion and soil surface loss or degradation both depart extremely to total. The indicators rills and pedestals and / or terracettes both depart moderate to extremely. Numerous headcuts are observed on site and are accelerating soil loss between pedestals. Soil loss depth ranges from 1-6" deep.
Hydrologic Function (H): **ME**	Moderate to Extreme Departure. The indicators soil surface resistance to erosion and soil surface loss or degradation both depart extremely to total. The indicators rills and pedestals and / or terracettes both depart moderate to extremely. Numerous headcuts are observed on site and are accelerating soil loss between pedestals. Soil loss depth ranges from 1-6" deep.
Biotic Integrity (B): **M**	Moderate Departure. The indicators soil surface resistance to erosion and soil surface loss or degradation both depart extremely to total. The indicators plant mortality/ decadence and reproductive capability of perennial plants both depart moderately. Soil surface loss is evident in headcutting. 20-30% mortality of PLRI3 which is the primary rill bank stabilizing species in this area. The mortality observed contributes the reduced reproductive capability of PLRI3 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:

Line Point Intercept

Year	Bare Ground	Veg. Canopy	Litter	Gravel/Stone	Cryptograms
2016	34.5%	10.5%	18.5%	35.5%	1.0%
2021	21.0%	11.0%	17.0%	51.0%	0.0%

Line Intercept and Density Data:

Plant Species KA1	Symbol	Cover (%)		Composition (%)		Density (Plants/Acre)	
Tree and Shrub Species		**2016**	**2021**	**2016**	**2021**	**2016**	**2021**
Ambrosia dumosa	AMDU2	1.03	1.4	10.20	14.22	338.08	325
Ditaxis lanceolata	ARLA12	-	-	-	-	26.01	-
Krameria grayi	KRGR	0.67	0.6	6.63	5.63	104.02	86
Larrea tridentata	LATR2	7.09	7.3	70.20	72.26	175.54	199
Lycium spp.	LYCIU	0.13	0.2	1.29	2.07	6.50	7
Total		8.92	9.5	88.32	94.18	650.15	617
Grasses							
Aristida spp.	ARIST	-	-	-	-	13.00	-
Panicum obtusum	PAOB	-	-	-	-	6.50	-

Pleuraphis rigida	PLRI3	0.95	0.2	9.41	1.58	104.02	86
Total		0.95	0.2	9.41	1.58	123.52	86
Succulents							
Ferocactus wislizeni	FEWI	0.23	0.3	2.28	3.06	13.00	20
Mammillaria spp.	MAMM	-	-	-	-	-	7
Total		0.23	0.3	2.28	3.06	12.00	27

Utilization Data:

KA1 Utilization			
SPECIES	**SYMBOL**	**% USE 2016**	**% USE 2021**
Pleuraphis rigida	PLRI3	35.0	33.3
Ambrosia dumosa	AMDU2	-	5.7
Krameria greyi	KRGR	-	11.6

1.2.2 Key Area 2

Interpreting Indicators of Rangeland Health: 2021

Attribute Rating:	Rationale:
Soil and Site Stability (S): **SM**	Slight to Moderate Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site. With the exception of a slight to moderate departure for the indicator water-flow patterns and a moderate departure for the indicator soil surface loss or degradation. Water-flow patterns are clearly broadening between pedestals and plant interspaces allowing for additional soil surface loss.
Hydrologic Function (H): **SM**	Slight to Moderate Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site. With the exception of a slight to moderate departure for the indicator water-flow patterns and a moderate departure for the indicator soil surface loss or degradation. Water-flow patterns are clearly broadening between pedestals and plant interspaces allowing for additional soil surface loss.
Biotic Integrity (B): **M**	Moderate Departure. The indicators soil surface loss or degradation, plant mortality/decadence, and reproductive capability of perennial plants all departed moderately. 20-30% mortality of PLRI3 was observed which impairs the reproductive capability of PLRI3. Some decadence (<20%) was observed on perennials.

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**	**Veg. Canopy**	**Litter**	**Gravel/Stone**	**Cryptograms**
2016	39.0%	15.0%	17.5%	24.0%	4.5%
2021	41.0%	11.5%	26.0%	19.0%	2.5%

Line Intercept and Density Data:

Plant Species KA2	Symbol	Cover (%)		Composition (%)		Density (Plants/Acre)	
Tree and Shrub Species		**2016**	**2021**	**2016**	**2021**	**2016**	**2021**
Ambrosia dumosa	AMDU2	0.04	0.2	0.25	1.94	78.02	113
Fouquieria splendens	FOSP2	1.07	0.5	6.72	3.96	45.51	40
Krameria grayi	KRGR	1.24	0.5	7.79	4.14	123.53	106
Larrea tridentata	LATR2	5.88	5.6	36.93	44.63	253.56	232
Parkinsonia microphylla	PAMI5	-	-	-	-	19.50	-
Total		8.23	6.8	51.69	54.67	520.12	491
Grasses							
Dasyochloa pulchella	DAPU7	0.03	0.0	0.19	0.09	637.15	126
Pleuraphis rigida	PLRI3	2.40	1.1	15.08	8.71	286.07	179
Total		2.43	1.1	15.27	8.8	923.22	305
Forbs- Perennial/Biennial							
Baileya multiradiata	BAMU	0.03	-	0.19	-	13.00	13
Marina parryi	MAPA7	0.03	-	0.19	-	58.51	-
Total		0.06	-	0.38	-	71.51	13
Succulents							
Cylindropuntia fulgida	CYFU10	0.44	0.6	2.76	4.49	6.50	13
Cylindropuntia leptocaulis	CYLE8	3.01	2.7	18.91	21.30	266.56	286
Cylindropuntia versicolor	CYVE3	1.73	1.3	10.87	10.39	84.52	53
Echinocereus engelmannii	ECEN	0.02	0.0	0.13	0.35	32.51	33
Mammillaria spp.	MAMMI	-	-	-	-	6.50	33
Total		5.2	4.6	32.67	36.53	396.59	418

Utilization Data:

KA2 Utilization			
SPECIES	**SYMBOL**	**% USE 2016**	**% USE 2021**
Pleuraphis rigida	PLRI3	9.5	12.1
Ambrosia dumosa	AMDU2	-	2.5
Krameria greyi	KRGR	-	11.3

1.2.3 Key Area 3

Interpreting Indicators of Rangeland Health: 2016

Attribute Rating:	Rationale:
Soil and Site Stability (S): **SM**	Slight to Moderate Departure. The indicator soil surface resistance to erosion departed moderate to extremely.

Hydrologic Function (H): **SM**	Slight to Moderate Departure. The indicator soil surface resistance to erosion departed moderate to extremely.
Biotic Integrity (B): **M**	Moderate Departure. The indicators soil surface resistance to erosion and reproductive capability of perennial plants both departed moderate to extremely. The indicator plant mortality/ decadence departed moderately.

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	Veg. Cover	Litter	Gravel/Stone	Cryptograms
2016	18.5%	23.0%	12.0%	41.0%	5.5%

Frequency and Composition Data:

Plant Species KA3	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species		**2016**	**2016**
Celtis pallida	CEPA8	1.50	0.98
Encelia farinosa	ENFA	2.00	0.80
Ephedra spp.	EPHED	1.00	0.55
Fouquieria splendens	FOSP2	15.00	10.43
Krameria erecta	KRER	6.50	5.34
Larrea tridentata	LATR2	20.50	17.73
Parkinsonia microphylla	PAMI5	3.50	3.87
Prosopis velutina	PRVE	0.50	0.43
Jatropha cardiophylla	JACA2	0.50	0.43
Total		51	40.56
Grasses			
Annual Grasses	AAGG	1.50	-
Aristida spp.	ARIST	1.00	0.31
Muhlenbergia porteri	MUPO2	12.00	9.45
Tridens spp.	TRIDE	41.00	24.29
Total		55.50	34.05
Forbs- Perennial/Biennial			
Annual Forbs	AAFF	12.50	-
Asclepias spp.	ASCLE	0.50	0.06
Ayenia spp.	AYENI	2.00	0.67
Commelina forskaolii	COFO3	30.00	17.30
Ditaxis lanceolata	DILA15	7.50	2.33
Euphorbia exstipulata	EUEX4	1.00	0.18
Psilostrophe cooperi	PSCO2	3.00	1.78
Senna covesii	SENNA	2.00	0.74
Sphaeralcea ambigua	SPHAE	1.00	0.18

Total		59.50	23.24
Succulents			
Carnegiea gigantea	CAGI10	1.50	0.12
Cylindropuntia leptocaulis	CYLE8	1.50	0.25
Cylindropuntia versicolor	CYVE3	2.50	0.80
Echinocereus engelmannii	ECEN	1.50	0.37
Opuntia spp.	OPUNT	1.00	0.61
Total		8.00	2.15

Utilization Data:

KA3 Utilization, 2016		
SPECIES	**SYMBOL**	**% USE**
Muhlenbergia porteri	MUPO2	50.67
Krameria erecta	KRER	37.90

1.2.4 Key Area 4

Interpreting Indicators of Rangeland Health: 2021

Attribute Rating:	Rationale:
Soil and Site Stability (S): **M**	Moderate Departure. The indicator compaction layer departed moderately to extremely. The indicators rills and soil surface loss and degradation both departed moderately. The indicators pedestals and/or terracetts and wind-scoured, blowouts, and/or deposition areas both departed slight to moderately. Headcutting 1-6" was observed on the majority of the rills in the area. Pedestals were also common an 3-5". Deposition was evident around ground features. A compaction layer was observed 1-6" deep.
Hydrologic Function (H): **M**	Moderate Departure. The indicator compaction layer departed moderately to extremely. The indicators rills and soil surface loss and degradation both departed moderately. The indicator pedestals and/or terracetts departed slight to moderately. Headcutting 1-6" was observed on the majority of the rills in the area. Pedestals were also common an 3-5". A compaction layer was observed 1-6" deep.
Biotic Integrity (B): **ME**	Moderate to Extreme Departure. The indicator plant morality/decadence departed extreme to total. The indicator compaction layer and reproductive capability of perennial plants both departed moderate to extremely. The indicator soil surface loss or degradation departed moderately. Approximately 50% mortality of the AMDU2 and 40-60% decadence on perennials were observed on the site. A compaction layer was observed 1-6" deep. Reproductive capability of all perennial plants, excluding LATR2, was impaired.

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**	**Veg. Canopy**	**Litter**	**Gravel/Stone**	**Cryptograms**
2016	21.0%	15.5%	11.5%	44.0%	8.0%
2021	27.5%	15.0%	11.5%	45.0%	1.0%

Line Intercept and Density Data:

Plant Species KA4	Symbol	Cover (%)		Composition (%)		Density (Plants/Acre)	
Tree and Shrub Species		**2016**	**2021**	**2016**	**2021**	**2016**	**2021**
Ambrosia dumosa	AMDU2	0.13	0.1	0.90	1.11	221.05	139
Larrea tridentata	LATR2	14.37	12.5	99.04	98.89	396.59	378
Lycium spp.	LYCIU	-	-	-	-	32.51	33
Total		14.50	12.6	99.94	100	650.15	550
Grasses							
Aristida spp.	ARIST	0.01	-	0.07	-	13.00	-
Total		0.01	-	0.07	-	13.00	-
Forbs- Perennial/Biennial							
Ditaxis lanceolata	DILA15	-	-	-	-	6.50	-
Total		-	-	-	-	6.50	-

Utilization Data:

KA4 Utilization			
SPECIES	**SYMBOL**	**% USE 2016**	**% USE 2021**
Pleuraphis rigida	PLRI3	35.7	29.1
Ambrosia dumosa	AMDU2	10.8	30.5

1.3 Coyote Flat #2 Allotment

1.3.1 Key Area 1

Interpreting Indicators of Rangeland Health: 2021

Attribute Rating:	Rationale:
Soil and Site Stability (S): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site. With the exception of soil surface loss or degradation that departed slight to moderately. Some historical soil loss was evident due to exposed AMDU2 roots.
Hydrologic Function (H): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site. With the exception of soil surface loss or degradation that departed slight to moderately. Historical soil loss was evident due to exposed AMDU2 roots.
Biotic Integrity (B): **SM**	Slight to Moderate Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure for the indicator plant mortality and decadence and Soil surface loss or degradation. 10-20% AMDU2 morality was observed on site. Also, historical soil loss was evident due to exposed AMDU2 roots.

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	Veg. Canopy	Litter	Gravel/Stone	Cryptograms
2016	33.0%	8.5%	10.0%	46.5%	2.0%
2021	32.0%	7.5%	12.5%	48.0%	0.0%

Line Intercept and Density Data:

Plant Species KA1	Symbol	Cover (%)		Composition (%)		Density (Plants/Acre)	
Tree and Shrub Species		**2016**	**2021**	**2016**	**2021**	**2016**	**2021**
Ambrosia deltoidea	AMDE4	1.29	-	15.45	-	13.00	13
Ambrosia dumosa	AMDU2	-	1.4	-	19.62	390.09	611
Larrea tridentata	LATR2	6.75	5.7	80.84	73.83	208.05	219
Lycium spp.	LYCIU	0.03	-	0.36	-	-	-
Total		8.07	7.1	96.65	93.45	611.14	843
Grasses							
Pleuraphis rigida	PLRI3	0.28	0.6	3.35	7.55	110.53	133
Total		0.28	0.6	3.35	7.55	110.53	133
Forbs- Perennial/Biennial							
Ditaxis lanceolata	DILA15	-	-	-	-	6.50	-
Total		-	-	-	-	6.50	-
Succulents							
Ferocactus wislizeni	FEWI	-	-	-	-	6.50	7
Total		-	-	-	-	6.50	7

Utilization Data:

KA1 Utilization			
SPECIES	**SYMBOL**	**% USE 2016**	**% USE 2021**
Pleuraphis rigida	PLRI3	22.77	17.2
Ambrosia Dumosa	AMDU2	-	5.0

1.3.2 Key Area 3

Interpreting Indicators of Rangeland Health: 2021

Attribute Rating:	Rationale:
Soil and Site Stability (S): **SM**	Slight to Moderate Departure. The compaction layer departed moderate to extremely. The indicator pedestals and terracettes departed slight to moderately. A compaction layer is evident on the plot where a two-track is forming. Pedestals are forming around LATR2 shrubs.

Hydrologic Function (H): **SM**	Slight to Moderate Departure. The compaction layer departed moderate to extremely. The indicator pedestals and terracettes departed slight to moderately. A compaction layer is evident on the plot where a two-track is forming. Pedestals are forming around LATR2 shrubs.
Biotic Integrity (B): **M**	Moderate Departure. The indicator functional/ structural groups departed moderate to extremely. The indicator compaction layer departed moderately. This site is 100% LATR2 (no other perennial species are present. A compaction layer is evident on the plot where a two-track is forming.

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	Veg. Canopy	Litter	Gravel/Stone	Cryptograms
2016	51.0%	6.0%	18.5%	18.0%	6.5%
2021	39.0%	5.0%	34.0%	20.5%	1.5%

Line Intercept and Density Data:

Plant Species KA3	Symbol	Cover (%)		Composition (%)		Density (Plants/Acre)	
Tree and Shrub Species		**2016**	**2021**	**2016**	**2021**	**2016**	**2021**
Larrea tridentata	LATR2	7.61	7.3	100.00	100.00	221.05	226
Total		7.61	7.3	100.00	100.00	221.05	226

Utilization Data:

KA3 Utilization			
SPECIES	**SYMBOL**	**% USE 2016**	**% USE 2021**
No palatable species	N/A	N/A	N/A

1.3.3 Key Area 4

Interpreting Indicators of Rangeland Health: 2021

Attribute Rating:	Rationale:
Soil and Site Stability (S): **M**	Moderate Departure. The indicator rills departed extremely to total due to numerous rills on the banks of the wash. The indicator soil surface loss or degradation departed moderate to extremely due to the erosion observed on the banks. The indicator soil surface resistance to erosion departed moderately due to the unprotected erosional features on the wash banks.
Hydrologic Function (H): **M**	Moderate Departure. The indicator rills departed extremely to total due to numerous rills on the banks of the wash. The indicator soil surface loss or degradation departed moderate to extremely due to the erosion observed on the banks. The indicator soil surface resistance to erosion departed moderately due to the unprotected erosional features on the wash banks.
Biotic Integrity (B): **M**	Moderate Departure. The indicator soil surface loss or degradation departed moderate to extremely due to the erosion observed on the banks. The indicator soil surface resistance to erosion departed moderately due to the unprotected erosional features on the wash banks. The indicator reproductive capability of

	perennial plants departed slight to moderately due to the impaired reproductive capability of perennial grasses.

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	Veg. Cover	Litter	Gravel/Stone	Cryptograms
2016	8.0%	81.0%	11.0%	0.0%	0.0%
2021	11.0%	70.0%	17.0%	1.0%	0.0%

Frequency and Composition Data:

Plant Species KA4	Symbol	Frequency (%)		Composition (%)	
Tree and Shrub Species		**2016**	**2021**	**2016**	**2021**
Acacia greggii	ACGR	13.00	13.00	8.40	10.71
Ambrosia ambrosioides	AMAM2	1.00	-	1.10	-
Ambrosia deltoidea	AMDE4	-	5.00		3.53
Baccharis sarothroides	BASA2	16.00	1.00	11.71	1.18
Condalia warnockii	COWA	6.00	3.00	5.52	3.53
Hymenoclea monogyra	HYMO	6.00	5.00	1.33	2.53
Larrea tridentata	LATR2	8.00	4.00	7.51	3.53
Lycium spp.	LYCIU	3.00	5.00	1.33	2.94
Olneya tesota	OLTE	3.00	4.00	3.31	4.47
Parkinsonia florida	PAFL6	42.00	38.00	43.76	39.76
Phoradendron californicum	PHQCA	-	12.00	-	6.00
Prosopis velutina	PRVE	17.00	14.00	13.92	14.00
Viguiera parishii	VIPA14	2.00	8.00	0.44	5.06
Total		177	112	98.33	99.17
Grasses					
Annual grass(es)	AAGG	2.00	46.00	-	-
Sporobolus cryptandrus	SPCR	1.00	1.00	0.11	0.82
Total		3.00	47.00	0.11	0.82
Forbs- Perennial/Biennial					
Annual forb(s)	AAFF	-	34.00	-	-
Funastrum cynanchoides	FUCY	-	2.00	-	1.29
Nicotiana obtusifolia	NIOB	5.00	-	1.55	-
Total		5.00	36.00	1.55	1.29

Utilization Data:

KA4 Utilization			
SPECIES	**SYMBOL**	**% USE 2016**	**% USE 2021**

Parkinsonia florida	PAFL6	9.5	17.1

1.3.4 Key Area 5

Interpreting Indicators of Rangeland Health: 2021

Attribute Rating:	Rationale:
Soil and Site Stability (S): **M**	Moderate Departure. The indicator soil surface loss or degradation departed moderate to extremely due to rill and gully formation. The indicator rills departed moderately due to them being common and exhibiting headcutting in the area. The indicator gullies departed moderately due to the formation of a gully in the center of the plot. The indicator wind-scoured, blowouts, and/ or deposition areas departed slight to moderately due to deposition being observed around ground features.
Hydrologic Function (H): **M**	Moderate Departure. The indicator soil surface loss or degradation departed moderate to extremely due to rill and gully formation. The indicator rills departed moderately due to them being common and exhibiting headcutting in the area. The indicator gullies departed moderately due to the formation of a gully in the center of the plot.
Biotic Integrity (B): **M**	Moderate Departure. The indicator soil surface loss or degradation departed moderate to extremely due to rill and gully formation. The indicator plant mortality/ decadence departed moderately due to a 20-30% decadence of perennial plants. The indicators functional/ structural groups and reproductive capability of perennial plants both departed slight to moderately due to the vegetation community being skewed towards trees and woody species and the limited composition of perennial grasses that have the potential to occupy the site.

Ground Cover Data:

Year	Bare Ground	Veg. Cover	Litter	Gravel/Stone	Cryptograms
2018	46.5%	22.0%	12.0%	3.0%	16.5%
2021	31.5%	22.5%	40.0%	4.0%	2.0%

Line Intercept and Density Data:

Plant Species KA5	Symbol	Cover (%)		Composition (%)		Density (Plants/Acre)	
Tree and Shrub Species		**2018**	**2021**	**2018**	**2021**	**2018**	**2021**
Ambrosia deltoidea	AMDE4	-	-	-	-	-	7
Ambrosia dumosa	AMDU2	-	-	-	-	6.64	20
Encelia farinosa	ENFA	0.01	-	0.04	-	-	-
Larrea tridentata	LATR2	14.17	17.60	58.34	65.66	411.70	518
Lycium spp.	LYCIU	0.48	1.30	1.98	4.79	79.68	66
Prosopis velutina	PRVE	9.48	7.70	39.03	28.88	26.56	33
Total		24.14	24.30	99.39	99.33	524.58	644

Grasses							
Muhlenbergia porteri	MUPO2	0.15	0.20	0.62	0.67	59.76	20
Total		0.15	0.20	0.62	0.67	59.76	20

Utilization Data:

KA5 Utilization			
SPECIES	**SYMBOL**	**% USE 2018**	**% USE 2021**
Muhlenbergia porteri	MUPO2	<2.5	7.2

1.4 Sentinel Allotment

1.4.1 Key Area 1

Interpreting Indicators of Rangeland Health: 2019

Attribute Rating:	Rationale:
Soil and Site Stability (S): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site.
Hydrologic Function (H): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B): **SM**	Slight to Moderate Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of the invasive plants indicator white departed moderately due to some sahara mustard present.

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:

Line Intercept and Density Study

Year	Bare Ground	Veg. Canopy	Litter	Gravel/Stone	Cryptograms
2014	0.5%	2.5%	0.0%	96.0%	0.5%
2019	4.0%	3.0%	1.5%	91.5%	0.0%

Line Intercept and Density Data:

Plant Species KA1	Symbol	Cover (%)		Composition (%)		Density (Plants/Acre)	
Tree and Shrub Species		**2014**	**2019**	**2014**	**2019**	**2014**	**2019**
Ambrosia deltoidea	AMDE4	0.3	4.5	1.27	13.6	32.70	418.35
Larrea tridentata	LATR2	19.3	24.4	81.43	73.72	70.85	132.80
Total		19.6	28.9	82.7	87.32	103.55	551.15
Grasses							
Aristida spp.	ARIST	-	-	-	-	-	6.64
Pleuraphis rigida	PLRI3	-	-	-	-	5.45	6.64

Total		-	-	-	-	5.45	13.28
Succulents							
Cylindropuntia ramosissima	CYRA9	-	4.2	-	12.69	32.70	46.48
Mammillaria spp.	MAMM	-	-	-	-	5.45	-
Total		-	4.2	-	12.69	38.15	46.48
Invasive/Noxious							
Brassica tournefortii	BRTO	-	-	-	-	-	6.64
Total		-	-	-	-	-	6.64

Utilization Data:

KA1 Utilization, 2019		
SPECIES	**SYMBOL**	**% USE**
No Palatable Species	N/A	N/A

1.4.2 Key Area 2

Interpreting Indicators of Rangeland Health: 2019

Attribute Rating:	Rationale:
Soil and Site Stability (S): **M**	Moderate Departure. The indicators rills, bare ground and soil surface loss or degradation all departed moderately due to accelerated soil loss and cutting within rills. The indicator water flow patterns departed slight to moderately.
Hydrologic Function (H): **M**	Moderate Departure. The indicators rills, bare ground and soil surface loss or degradation all departed moderately due to accelerated soil loss and cutting within rills. The indicator water flow patterns departed slight to moderately.
Biotic Integrity (B): **M**	Moderate Departure. The indicator invasive plants departed moderately to extremely due to the recent encroachment of buffelgrass on the site. The indicator soil surface loss or degradation departed moderately due to soil running off in rills.

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**	**Veg. Canopy**	**Litter**	**Gravel/Stone**	**Cryptograms**
2014	16.0%	54.0%	19.0%	10%	1.0%
2019	40.0%	50.0%	1.0%	7.0%	2.0%

Frequency and Composition Data:

Plant Species KA2	**Symbol**	**Frequency (%)**		**Composition (%)**	
Tree and Shrub Species		**2014**	**2019**	**2014**	**2019**
Ambrosia deltoidea	AMDE4	38	40	31	27.53
Prosopis velutina	PRVE	19	17	18	20.27
Krameria grayi	KRGR	-	1	-	1.23
Larrea tridentata	LATR2	17	22	14	21.23

Parkinsonia florida	PAFL6	20	14	17	14.11
Total		94	94	80	84.37
Grasses					
Pleuraphis rigida	PLRI3	12	5	10	5.89
Total		12	5	10	5.89
Forbs- Perennial/Biennial					
Marina parryi	MAPA7	15	29	6	9.04
Ditaxis neomexicana	DITAX	1	1	1	0.14
Hesperocallis undulata	HEUN2	2	-	3	-
Total		18	30	10	9.18
Succulents					
Ferocactus wislizeni	FEWI	1	-	1	-
Total		1	-	1	-
Invasive/Noxious					
Cenchrus ciliaris	CECI	-	2	-	0.55
Total		-	2	-	0.55

Utilization Data:

KA2 Utilization, 2019		
SPECIES	**SYMBOL**	**% USE**
Pleuraphis rigida	PLRI3	14.2
Krameria grayi	KRGR	2.5

1.4.3 Key Area 3

Interpreting Indicators of Rangeland Health: 2016

Attribute Rating:	Rationale:
Soil and Site Stability (S): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site.
Hydrologic Function (H): **NS**	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B): **NS**	None to Slight Departure. The indicators observed, 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**	**Veg. Cover**	**Litter**	**Gravel/Stone**	**Cryptograms**
2014	45.0%	6%	34.0%	5.0%	11.0%
2016	43.7%	7.7%	8.8%	7.7%	32.0%

Line Intercept and Density Data:

Plant Species KA3	Symbol	Cover (%)		Composition (%)		Density (Plants/Acre)	
Tree and Shrub Species		**2014**	**2016**	**2014**	**2016**	**2014**	**2016**
Ambrosia deltoidea	AMDE4	-	11.5	14.18	13.84	119.90	139.4
Ambrosia dumosa	AMDU2	-	8.4	7.35	10.11	158.05	146.1
Krameria grayi	KRGR	-	5.3	3.87	6.38	43.60	53.1
Larrea tridentata	LATR2	-	18.4	29.25	22.14	109.00	112.9
Total		-	43.6	54.65	52.47	430.55	451.5
Grasses							
Pleuraphis rigida	PLRI3	-	31.4	37.76	37.79	305.20	358.6
Total		-	31.4	37.76	37.79	305.20	358.6
Forbs- Perennial/Biennial							
Marina parryi	MAPA7	-	-	-	-	5.45	-
Proboscidea altheaefolia	PRAL	-	-	-	-	272.50	-
Hesperocallis undulata	HEUN2	-	-	-	-	32.70	-
Total		-	-	-	-	310.65	-
Succulents							
Cylindropuntia ramosissima	CYRA9	-	8.1	7.60	9.75	70.85	79.7
Total		-	8.1	7.60	9.75	70.85	79.7
Invasive/Noxious							
Brassica tournefortii	BRTO	-	-	-	-	566.80	-
Total		-	-	-	-	566.80	-

Utilization Data:

KA3 Utilization				
SPECIES	**SYMBOL**	**% USE 2014**	**% USE 2016**	**% USE 2019**
Pleuraphis rigida	PLRI3	2.5	2.5	3.2
Krameria grayi	KRGR	2.5	2.5	3.0
Ambrosia dumosa	AMDU2	2.5	-	2.5

1.4.4 Key Area 4

Interpreting Indicators of Rangeland Health: 2016

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

Biotic Integrity (B): **SM**	Slight to Moderate Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of the invasive plants indicator white departed moderately due to some buffelgrass present to the east of the plot.

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	Veg. Canopy	Litter	Gravel/Stone	Cryptograms
2016	34.0%	22.0%	20.0%	19.5%	4.5%

Line Intercept and Density Data:

Plant Species KA4	Symbol	Cover (%)	Composition (%)	Density (Plants/Acre)
Tree and Shrub Species		**2016**	**2016**	**2016**
Ambrosia deltoidea	AMDE4	3.81	14.34	358.57
Larrea tridentata	LATR2	7.92	29.81	126.16
Olneya tesota	OLTE	1.39	5.23	6.64
Fouquieria splendens	FOSP2	0.22	0.83	-
Krameria grayi	KRGR	2.26	8.51	139.45
Parkinsonia microphylla	PAMI5	1.74	6.55	33.2
Total		17.34	65.27	664.02
Grasses				
Pleuraphis rigida	PLRI3	8.39	31.58	199.21
Aristida spp.	ARIST	0.19	0.72	132.80
Total		8.58	32.30	332.01
Forbs- Perennial/Biennial				
Ditaxis neomexicana	DINE2	0.14	0.53	723.79
Euphorbia exstipulata	EUEX4	-	-	66.4
Marina parryi	MAPA7	0.24	0.9	258.97
Sphaeralcea ambigua	SPAM2	0.15	0.56	172.65
Total		0.53	1.99	1221.81
Succulents		0.38	1.43	1049.16
Cylindropuntia leptocaulis	CYLE8	0.12	0.45	19.92
Total		0.12	0.45	19.92

Utilization Data:

KA4 Utilization			
SPECIES	**SYMBOL**	**% USE 2016**	**% USE 2019**
Pleuraphis rigida	PLRI3	2.5	5.0
Krameria grayi	KRGR	2.5	3.6

2.0 Ajo/Sentinel 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.

Symbol	Scientific Name	Common Name
Shrubs		
AMDE4	*Ambrosia deltoidea*	triangle bur ragweed
AMDU2	*Ambrosia dumosa*	burrobush
BASA2	*Baccharis sarothroides*	desertbroom
CAEM4	*Castela emoryi*	crucifixion thorn
CAER	*Calliandra eriophylla*	fairyduster
CEPA8	*Celtis pallida*	spiny hackberry
COFO3	*Commelina forskaolii*	rat's ear
COWA	*Condalia warnockii*	Warnock's snakewood
DILA15	*Ditaxis lanceolata*	narrowleaf silverbush
ENFA	*Encelia farinosa*	brittlebush
EPHED	*Ephedra spp.*	jointfir
FOSP2	*Fouquieria splendens*	ocotillo
HYMO	*Hymenoclea monogyra*	singlewhorl burrobrush
JACA2	*Jatropha cardiophylla*	sangre de cristo
KRGR	*Krameria grayi*	white ratany
LATR2	*Larrea tridentata*	creosote bush
LYCIU	*Lycium spp.*	desert-thorn
VIPA14	*Viguiera parishii*	Parish's goldeneye
Trees		
ACCO2	*Acacia constricta*	whitethorn acacia
ACGR	*Acacia greggii*	catclaw acacia
OLTE	*Olneya tesota*	desert ironwood
PAFL6	*Parkinsonia florida*	blue paloverde
PAMI5	*Parkinsonia microphylla*	yellow paloverde
PRVE	*Prosopis velutina*	velvet mesquite
Succulents		
CAGI10	*Carnegiea gigantea*	saguaro
CYBI9	*Cylindropuntia bigelovii*	teddybear cholla
CYFU10	*Cylindropuntia fulgida*	jumping cholla
CYLE8	*Cylindropuntia leptocaulis*	Christmas cactus
CYRA9	*Cylindropuntia ramosissima*	Diamond cholla
CYVE3	*Cylindropuntia versicolor*	staghorn cholla
ECEN	*Echinocereus engelmannii*	Engelmann's hedgehog cactus

FEWI	*Ferocactus wislizeni*	candy barrelcactus
MAMMI	*Mammillaria*	globe cactus
OPUNT	*Opuntia*	pricklypear
STTH3	*Stenocereus thurberi*	organpipe cactus
Perennial grass		
ARIST	*Aristida*	threeawn
BOBA3	*Bothriochloa barbinodis var. perforata*	cane bluestem
DAPU7	*Dasyochloa pulchella*	low woollygrass
MUPO2	*Muhlenbergia porteri*	bush muhly
PAOB	*Panicum obtusum*	vine mesquite
PLRI3	*Pleuraphis rigida*	big galleta
SPCR	*Sporobolus cryptandrus*	sand dropseed
TRIDE	*Tridens*	tridens
Perennial forbs/vines		
ACWR5	*Acourtia wrightii*	brownfoot
ASCLE	*Asclepias*	milkweed
AYENI	*Ayenia*	ayenia
BAMU	*Baileya multiradiata*	desert marigold
ERIN4	*Eriogonum inflatum*	desert trumpet
EUPHO	*Euphorbia*	spurge
FUCYC	*Funastrum cynanchoides ssp. cynanchoides*	fringed twinevine
JAGR	*Janusia gracilis*	slender janusia
MAPA7	*Marina parryi*	Parry's false prairie-clover
NIOB	*Nicotiana obtusifolia*	desert tobacco
POCO30	*Polycarpaea corymbosa*	oldman's cap
PSILO3	*Psilostrophe*	paperflower
SENNA	*Senna*	senna
SPHAE	*Sphaeralcea spp.*	globemallow
Annuals		
AAFF	Annual forb(s)	
AAGG	Annual grass(es)	
EUEX4	*Euphorbia exstipulata*	squareseed spurge