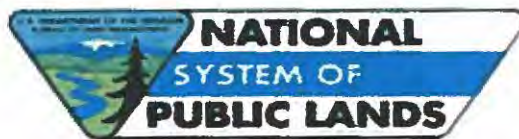


Puerco Ridge Allotment (No. 06176), Long H Ranch Allotment (No. 01781) and Hardscrabble Wash Allotment (No.06110) Draft Land Health Evaluation

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United States Department of the Interior  
Bureau of Land Management  
Safford Field Office  
Safford, AZ



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Land Health Evaluation Report  
Puerco Ridge (No. 06176)  
Long H Ranch (No. 01781)  
Hardscrabble Wash (No. 06110)

July 2021



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## List of Acronyms

ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AMP	Allotment Management Plan
AUM	Animal Unit Month
AZGFD	Arizona Game and Fish Department
BLM	Bureau of Land Management
BO	Biological Opinion
CFR	Code of Federal Regulations
DPC	Desired Plant Community
EDIT	Ecological Dynamics Interpretive Tool
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESD	Ecological Site Description
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy and Management Act
GIS	Geographic Information System
GPS	Global Positioning System
HCPC	Historical Climax Plant Communities
HMDS	Heritage Data Management System
HUC	Hydrologic Unit Code
ID Team	Interdisciplinary Team
IIRH	Interpreting Indicators of Rangeland Health
IPaC	Information for Planning and Conservation system
lbs/ac	Pounds per acre
LHE	Land Health Evaluation
LPI	Line Point Intercept
LUP	Land Use Plan
MLRA	Major Land Resource Area
NAD	North American Datum
NRCS	Natural Resources Conservation Service
P.L.	Public Law
p.z.	precipitation zone
PRISM	Parameter-elevation Regression on Independent Slopes Model
RAS	Rangeland Administration System
RHA	Rangeland Health Assessment
RMP	Resource Management Plan
ROD	Record of Decision
STM	State and Transition Model
T&E	Threatened and Endangered
TCP	traditional cultural property
TEAMS	[USFS] Talent, Expertise, Agility, Mobility, and Simplicity Enterprise Unit
U.S.C	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

## **1 Introduction**

The purpose of this land health evaluation (LHE) report is to determine whether the Arizona Standards for Rangeland Health are being achieved on the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment, or if the standards are not being achieved, to determine if livestock is the causal factor for not achieving or making significant progress towards achieving land health standards. This evaluation is not a decision document but a stand-alone report that records the analysis and interpretation of the available inventory and monitoring data.

The Secretary of the Interior approved the Bureau of Land Management (BLM) Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (Arizona Standards and Guidelines) in April 1997. Signed by the Arizona BLM State Director, the Arizona Standards and Guidelines provide for full implementation of the Standards and Guidelines in Arizona BLM land use plans (LUP). Standards and guidelines are implemented by the BLM through terms and conditions of grazing permits, leases, and other authorizations, grazing-related portions of activity plans (including Allotment Management Plans), and through range improvement-related activities.

Land health standards are measurable and attainable goals for the desired condition of the biological resources and physical components/characteristics of desert ecosystems found within the allotment.

The LHE report ascertains:

1. If standards for rangeland health are being achieved, not achieved, or if significant progress is being made towards achievement of land health standards.
2. Whether livestock grazing is a significant causal factor where it is determined that land health standards are not being achieved.

This report covers an evaluation period of 10 years (2010-2019). This is a standard evaluation period that provides the BLM the ability to collect an adequate amount of information related to grazing use and environmental factors pertaining to the permit renewal process.

### **1.1 Consultation, Cooperation, and Coordination**

A letter to interested publics informing that the Puerco Ridge Allotment, Long H Allotment and Hardscrabble Wash Allotment were being considered for permit renewal was distributed via certified mail August 13, 2020. No responses were received. Data on special status species was obtained from the U.S. Fish and Wildlife Service (USFWS) and the Arizona Game and Fish Department (AZGFD).

### **1.1 Definition of Arizona Standards for Rangeland Health and Guidelines for Grazing Administration**

The Arizona standards for rangeland health are expressions of levels of physical and biological condition or degree of function required for healthy, sustainable rangelands and defines

minimum resource conditions that must be achieved and maintained. Determination of rangeland health is based upon conformance with these standards.

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

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

The Arizona Standards and Guidelines identify three standards regarding (1) upland sites, (2) riparian-wetland sites, and (3) desired resource conditions based on specific indicators, as discussed in Section 5 Rangeland Inventory and Monitoring Methodology of this document.

## **2 Allotment Profile and General Description of Evaluation Area**

### **2.1 Location**

The Puerco Ridge Allotment, Long H Ranch Allotment, and Hardscrabble Wash Allotment are located approximately 23 miles north of the town of St. Johns, Arizona (Figure 1).



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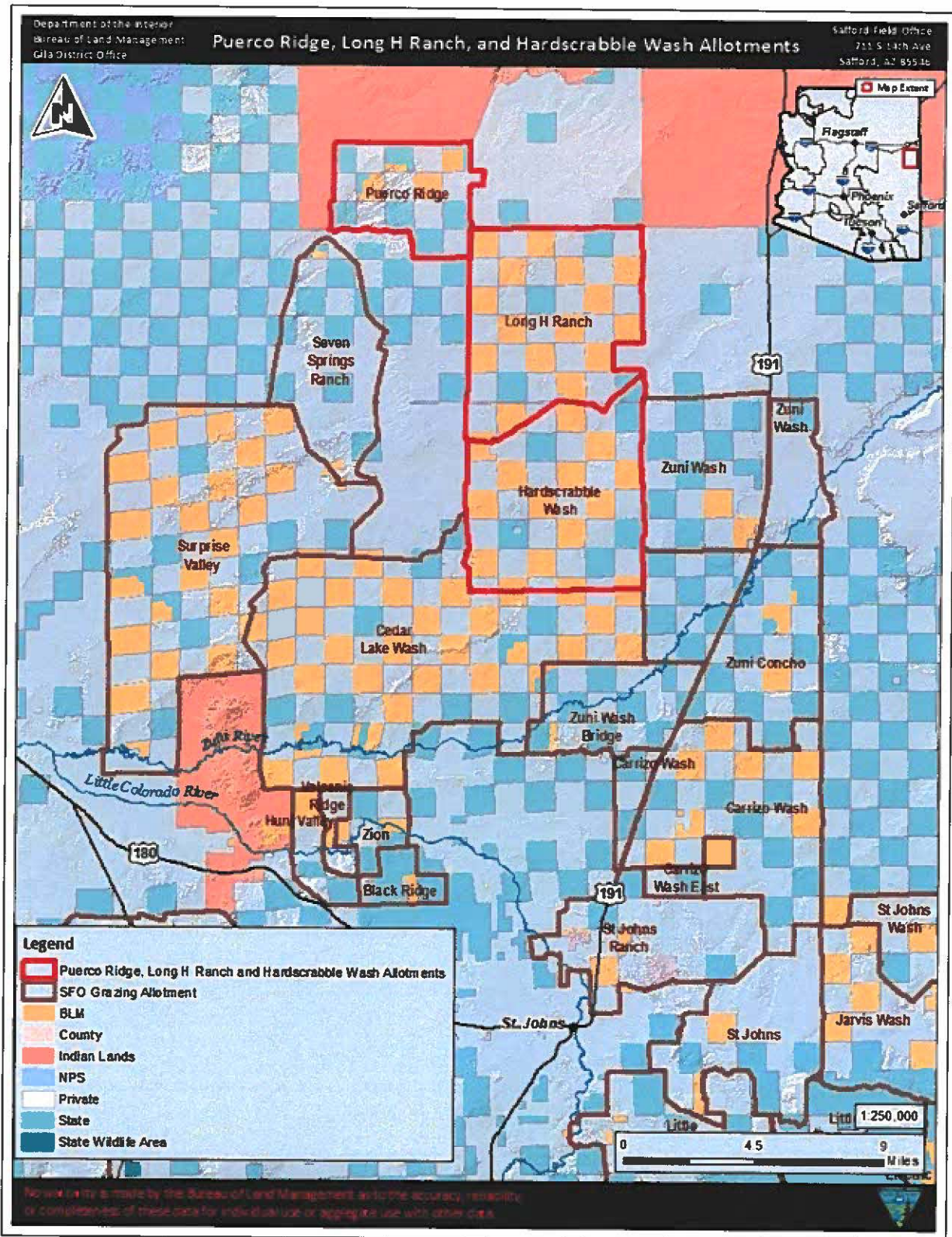


Figure 1. Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment Vicinity

## 2.1 Physical Description

A physical description of the Puerco Ridge Allotment, Long H Ranch Allotment, and Hardscrabble Wash Allotment follows.

### 2.2.1 Surface Land Ownership

The Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment are comprised predominately of private lands intermixed with State Trust lands and BLM-administered lands. Land ownership apportionments are displayed in Table 1 for the Puerco Ridge Allotment, Table 2 for the Long H Ranch Allotment and Table 3 for the Hardscrabble Wash Allotment.

**Table 1. Puerco Ridge Allotment Landownership**

Land Classification	Acres	Percent of Allotment
BLM-administered Acres	1,581	15%
State Trust Land Acres	3,899	37%
Private Land Acres	5,160	48%
Total Acres	10,640	100%

Source: BLM GIS data set

**Table 2. Long H Ranch Allotment Landownership**

Land Classification	Acres	Percent of Allotment
BLM-administered Acres	9,734	41%
State Trust Land Acres	2,250	9%
Private Land Acres	12,060	50%
Total Acres	24,044	100%

Source: BLM GIS data set

**Table 3. Hardscrabble Wash Allotment Landownership**

Land Classification	Acres	Percent of Allotment
BLM-administered Acres	8,415	35%
State Trust Land Acres	3,582	15%
Private Land Acres	11,969	50%
Total Acres	23,966	100%

Source: BLM GIS data set

### 2.2.2 Precipitation

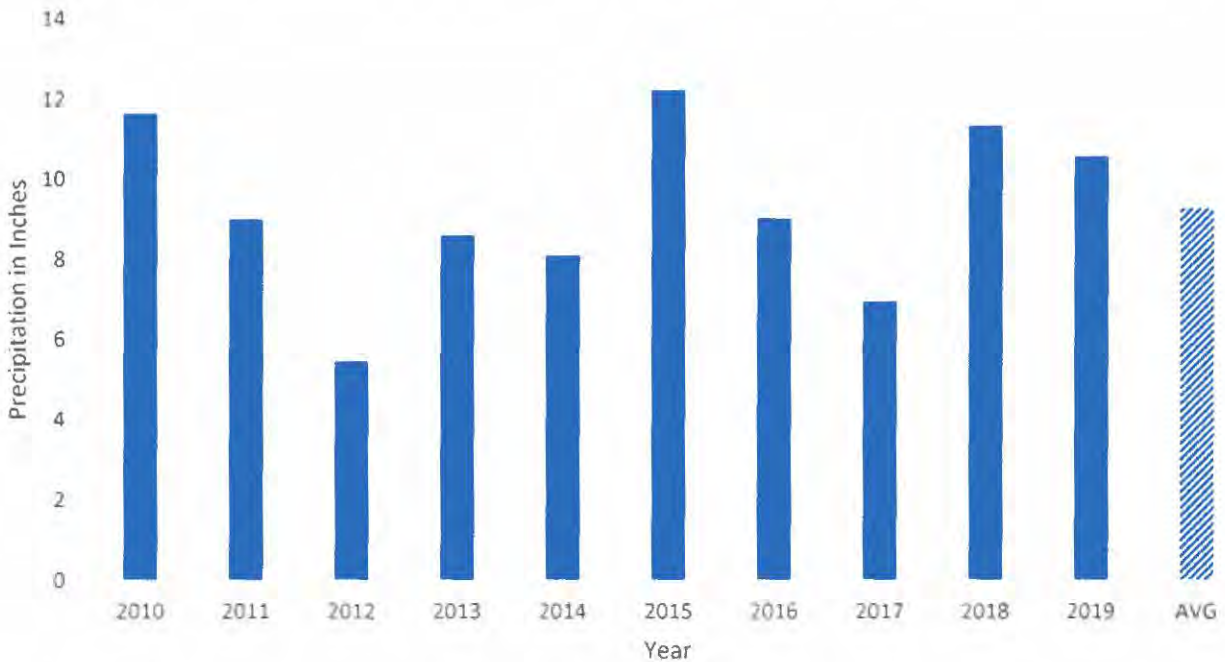
Precipitation data from the Parameter-elevation of Independent Slopes Model (PRISM) climate datasets (PRISM 2020) were utilized for **Error! Reference source not found.** by selecting a

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central point that is representative of all three allotments for both precipitation and temperature as follows:

- Latitude: 34.8513
- Longitude: -109.3548
- Elevation of 6,037 feet

Climatic data from this source is not collected from a single station but is modeled using data from many stations and physiographic factors in the area.



**Figure 2. Average Annual Precipitation from PRISM Time Series Data 2010-2019**  
Source: PRISM, 2020.

**2.2.3 Temperatures**

The typical minimum, maximum, and average temperature within the Puerco Ridge Allotment, Long H Ranch Allotment, and Hardscrabble Wash Allotment between 2010 and 2019 are provided below in Table 4.

**Table 4. Temperatures in Degrees Fahrenheit on Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment**

Year	Minimum (°F)	Maximum (°F)	Average (°F)
2010	36.6	68.1	52.3
2011	35.2	67.9	51.6
2012	5.46	71.2	53.9

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Year	Minimum (°F)	Maximum (°F)	Average (°F)
2013	35.7	67.8	51.7
2014	37.1	70.3	53.7
2015	37.9	69.5	53.7
2016	36.6	70.4	53.5
2017	37.6	71.6	54.6
2018	37.3	70.7	54.0
2019	36.6	67.9	52.2

Source: PRISIM, 2020.

### 2.2.4 Soils

The soil composition for the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment are varied and are presented respectively in Tables 5-7 and **Error! Reference source not found.** All the soils located within these allotments are classified as arid and semiarid.

**Table 5. Soil Composition on the Puerco Ridge Allotment**

Soil Map Unit Name	Allotment Acres	Total Composition	BLM Acres	BLM Composition
Clovis-Palma association, undulating	3,441	32.3%	496	31.4%
Clovis loamy sand, 0 to 8 percent slopes	879	8.3%	160	10.1%
Eroded land	879	8.3%	132	8.3%
Gullied land	2,709	25.5%	540	34.2%
Palma-Sheppard association, undulating	1,912	17.9%	251	15.9%
Sheppard loamy sand, 0 to 8 percent slopes	820	7.7%	2	0.1%

Source: USDA NRCS Web Soil Survey (2015)

**Table 6. Soil Composition on the Long H Ranch Allotment**

Soil Map Unit Name	Allotment Acres	Total Composition	BLM Acres	BLM Composition
Clovis-Palma association, undulating	7,063	29.4%	3,221	33.1%
Clovis loamy sand, 0 to 8 percent slopes	62	0.3%	38	0.4%
Eroded land	825	3.4%	354	3.6%
Gullied land	300	1.2%	73	0.7%
Loamy alluvial land	474	1.9%	76	0.8%

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Palma-Sheppard association, undulating	15,257	63.5%	5,972	61.4%
Palma loamy sand, 0 to 8 percent slopes	63	0.3%	0	0%

Source: USDA NRCS Web Soil Survey (2015)

**Table 7. Soil Composition on the Hardscrabble Wash Allotment**

Soil Map Unit Name	Allotment Acres	Total Composition	BLM Acres	BLM Composition
Badland	627	2.6%	488	5.8%
Claysprings clay, 0 to 8 percent slopes	301	1.3%	173	2.1%
Clovis-Palma association, undulating	6,973	29.1%	2,734	32.5%
Clovis loamy sand, 0 to 8 percent slopes	2,722	11.4%	777	9.2%
Eroded land	669	2.8%	161	1.9%
Fruitland sandy loam 1 to 8 percent slopes	1,004	4.2%	538	6.4%
Loamy alluvial land	22	0.1%	0	0%
Navajo clay	656	2.7%	75	0.9%
Palma-Sheppard association, undulating	5,043	21.0%	1,451	17.2%
Rough broken land	1,065	4.4%	298	3.5%
Tours clay loam	4,739	19.8%	1,610	19.1%
Tours loam	145	0.6%	110	1.3%

Source: USDA NRCS Web Soil Survey (2015)

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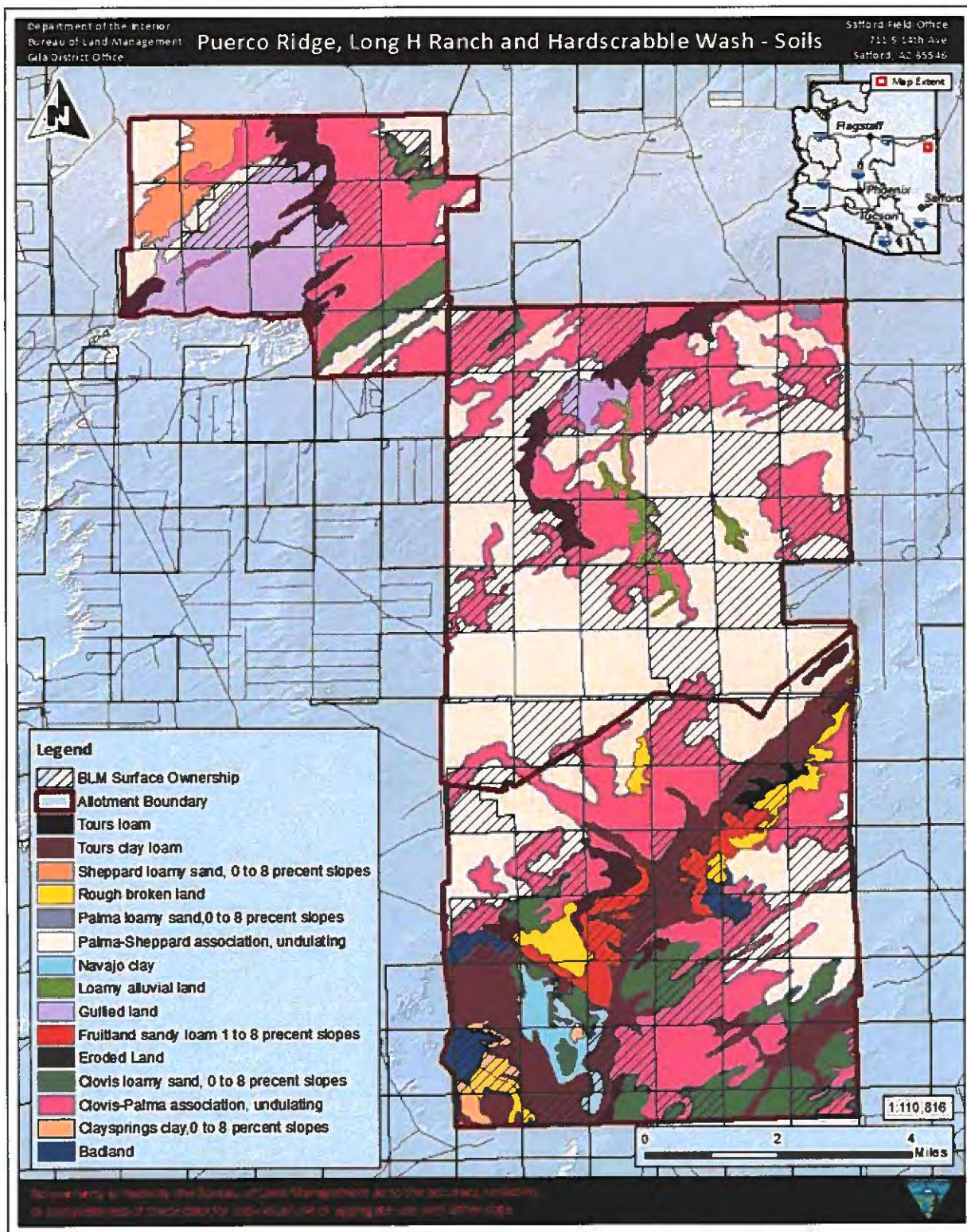


Figure 3. Soil Descriptions on the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotments

Source: USDI BLM 2017, USDA NRCS 2015

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The following soil descriptions that have greater than five percent occurrence on BLM-administered lands will be carried forward in this LHE:

- Badland
- Clovis loamy sand, 0 to 8 percent slopes
- Clovis-Palma association, undulating
- Eroded land
- Fruitland sandy loam, 1 to 8 percent slopes
- Gullied land
- Palma-Sheppard association, undulating
- Tours clay loam

All soil information came from <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.

#### *Badland*

The Badland is not a soil type due to being made up of various layers of different soil types, and on the Hardscrabble Wash Allotment, it is composed of the Chinle Formation (Late Triassic, 210-230 Ma). Badland consists of moderately steep to very steep with dominant slopes ranging 30 to 50 percent, and nearly barren areas of highly erodible, multicolored, clayey shales and siltstones interbedded with thin layers of harder sandstone and conglomerate. These shaly areas are dissected by numerous drainageways, leaving small remnants as ridges and low buttes capped by the more resistant sandstone and conglomerate rocks.

#### *Clovis loamy sand, 0 to 8 percent slopes*

The Clovis series consists of very deep, well drained, moderately permeable soils that formed from eolian sands and gravelly alluvium parent materials derived from metamorphic and sedimentary rock. The Clovis soils are on fan terraces, piedmont slopes, and plains. Elevations range from 5,400 to 7,000 feet, and slopes are 0 to 8 percent. The mean annual precipitation is about 12 to 16 inches. The mean annual temperature is about 52 to 55 degrees Fahrenheit (°F). Permeability is moderate or moderately slow, and runoff is low.

#### *Clovis-Palma association, undulating*

The Clovis-Palma association, undulating consists of very deep, well drained, moderately permeable soils that formed from eolian sands and gravelly alluvium parent materials derived from metamorphic and sedimentary rock. This soil occurs as terraces, summits and treads. Elevations range from 5,400 to 7,000 feet, and slopes are 0 to 8 percent. The mean annual precipitation is about 10 to 14 inches. The mean annual temperature is about 52 to 55°F. Permeability is moderate or moderately slow, and runoff is low.

#### *Eroded land*

The Natural Resources Conservation Service (NRCS) only gives a landform description of Eroded land. The description states that it occurs as escarpments and terraces and is associated with the Sandy Upland 10-14" p.z. (R035XA118AZ) ecological site.

#### *Fruitland sandy loam, 1 to 8 percent slopes*

The Fruitland sandy loam, 1 to 8 percent slopes occurs as alluvial fans with deep, well drained and moderately permeable soils. Elevations range from 5,500 to 7,000 feet, and slopes are 0 to 8

percent. The mean annual precipitation is about 10 to 13 inches. The mean annual temperature is about 49 to 53°F, and runoff is medium.

#### *Gullied land*

The NRCS only gives a landform description of Gullied land. The description states that it occurs as gullies, ridges and escarpments.

#### *Palma-Sheppard association, undulating*

The Palma-Sheppard association, undulating consists of very deep, well drained, moderately permeable soils that formed from eolian sands and gravelly alluvium parent materials derived from metamorphic and sedimentary rock. This soil occurs as interdunes. Elevations range from 5,400 to 6,600 feet, and slopes are 0 to 8 percent. The mean annual precipitation is about 8 to 13 inches. The mean annual temperature is about 52 to 55°F. Permeability is moderate or moderately slow, and runoff is low.

#### *Tours clay loam, 0 to 1 percent slope*

The Tours clay loam, 0 to 1 percent slope soil consist of very deep, well drained, stratified soils that formed in stream alluvium. Tours clay loam soil occurs on alluvial fans and flood plains at elevations ranging from 5,400 to 7,000 feet, and slopes are from 1 to 5 percent. The mean annual precipitation is 8 to 12 inches. The mean annual air temperature is about 48 to 54°F. Soils are well drained with low run off.

### **2.2.5 Watershed**

All three allotments lie within three watersheds: Dry Wash, Milky Wash and Hardscrabble Wash watersheds (HUC-10 1502000704, 1502000205, and 1502000408 respectively). The Little Colorado River is located approximately 8.5 miles southwest of the Hardscrabble Wash Allotment, is an intermittent stream with some reaches flowing perennially closer to its headwaters and is one of two major tributaries to the Colorado River in Arizona. The Little Colorado River drains the Little Colorado Basin (HUC-6 150200), which has a drainage area of 26,000 square miles extending into New Mexico.

These three allotments lie entirely within the “Little Colorado River Plateau” Arizona Department of Water Resources (ADWR) Groundwater Basin and is not within an ADWR Active Management Area. The groundwater basin consists of the following aquifers: unconsolidated alluvium from streams, volcanic bedrock (Lakeside-Pinetop Aquifer), and consolidated sedimentary aquifers: Bidahochi, C, D, N, Springerville, and White Mountain Aquifers (EPA N.d.).

The nearest surface waters to the allotments are ephemeral washes and natural depressions, primarily having peak flows from precipitation events. Milky Wash flows through the central and southwestern part of the Puerco Ridge Allotment; Hardscrabble Wash flows from the northeastern corner of the Hardscrabble Wash Allotment to the southern boundary. Both washes cross private, State Land and BLM-administered lands, and are tributaries to the Little Colorado River. The majority of all three allotments are located within a Federal Emergency Management Agency Zone D floodplain meaning undetermined but possible flood hazard. Hardscrabble Wash



lies within a 100-year, 1 percent chance of flooding in any single year, floodplain. Water quality is monitored and listed by Arizona Department of Environmental Quality (ADEQ) for the Environmental Protection Agency 303(d) waterbody impairments under the federal Clean Water Act, and there are no impaired waters on these allotments.

### ***2.2.6 Range Improvements***

Only range improvements on BLM-administered land are considered for this evaluation. See **Error! Reference source not found.** for the range improvements occurring on Puerco Ridge, Long H Ranch, and Hardscrabble Wash allotments. Range improvements on BLM-administered lands within the Puerco Ridge Allotment consist of internal pasture fencing, enclosed poly tanks, troughs, pipelines and a dirt tank. The Long H Ranch Allotment range improvements located on BLM-administered land consist of a boundary fence. The Hardscrabble Wash Allotment has boundary and internal pasture fences, a trough, pipeline and two dirt tanks on the BLM-administered land.

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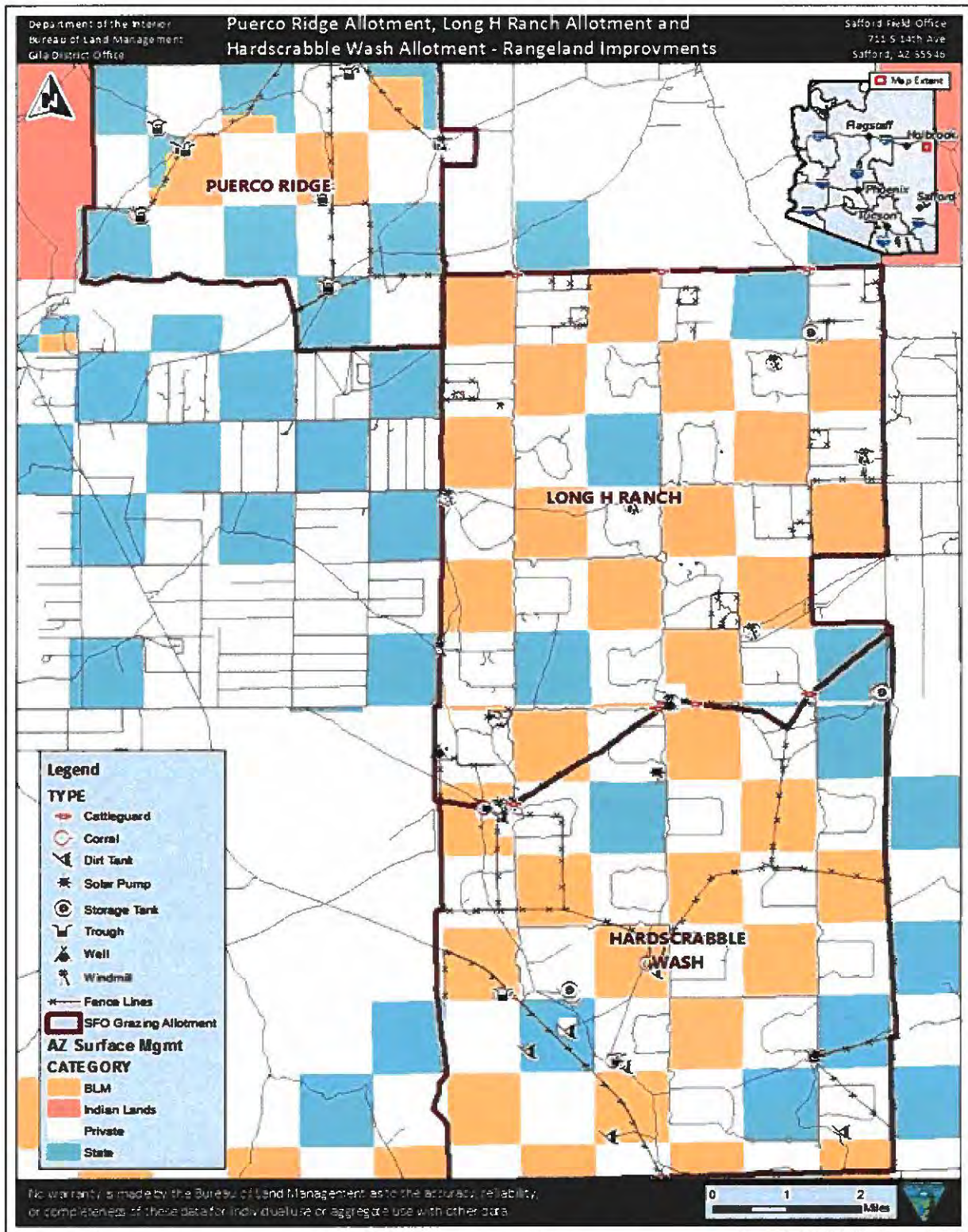


Figure 4 Range Improvements on the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotments

Source: USDI BLM 2017

## 2.1 Biological Resources

This section discusses the biological resources within the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment.

### 2.3.1 Major Land Resource Areas

A Major Land Resource Area (MLRA) is a broad geographic area characterized by a particular pattern of soils, climate, water resources, vegetation, and land use. Each MLRA in which rangeland and forestland occur is divided into sub-resource areas, and further divided into ecological sites. The Puerco Ridge, Long H Ranch and Hardscrabble Wash allotments are located in the Colorado Plateau MLRA (35) and lie within the Mixed Grass Plains (35-1) sub-resource area.

### 2.3.2 Ecological Sites within the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment

Ecological sites provide a consistent framework for classifying and describing rangeland soils and vegetation, thereby delineating land units that share similar capabilities to respond to management activities or disturbance. Ecological Site Descriptions (ESD) are developed by the National Resources Conservation Service (NRCS) and partners to document the properties of ecological sites. These include climate, soil, geomorphology, hydrology, and vegetation information that describe the behavior of individual ecological sites. Since an ecological site might feature several plant communities that occur over time or in response to land management, these descriptions can be used to interpret ecological changes (Perez 2017).

Ecological sites summaries that are present within the three allotments are presented below in Tables 8-10 and **Error! Reference source not found.5**. The ESDs on BLM-administered land portions of the allotment are also summarized. Detailed NRCS ESD reports are stored and accessed within the Ecological Dynamics Interpretive Tool (EDIT) available online: <https://edit.jornada.nmsu.edu/>. Not all ESDs have been fully evaluated; in such cases, currently available information was used.

**Table 8. Ecological Sites on the Puerco Ridge Allotment**

Ecological Site	Allotment Acres	BLM Acres	BLM Composition
Gullied Land	2,710	541	34.2%
Sandy Loam Upland 10-14" (R035XA117AZ)	6,231	907	57.4%
Sandy Upland 10-14" (R035XA118AZ)	1,699	133	8.4%

Source: NRCS

Puerco Ridge Allotment (No. 06176), Long H Ranch Allotment (No. 01781) and Hardscrabble Wash Allotment (No.06110) Draft Land Health Evaluation

**Table 9. Ecological Sites on the Long H Ranch Allotment**

Ecological Site	Allotment Acres	BLM Acres	BLM Composition
Gullied Land	300	73	0.8%
Loamy Bottom 10-14" (R035XA112AZ)	474	76	0.8%
Sandy Loam Upland 10-14" ((R035XA117AZ)	22,445	9,231	94.8%
Sandy Upland 10-14" (R035XA118AZ)	825	354	3.6%

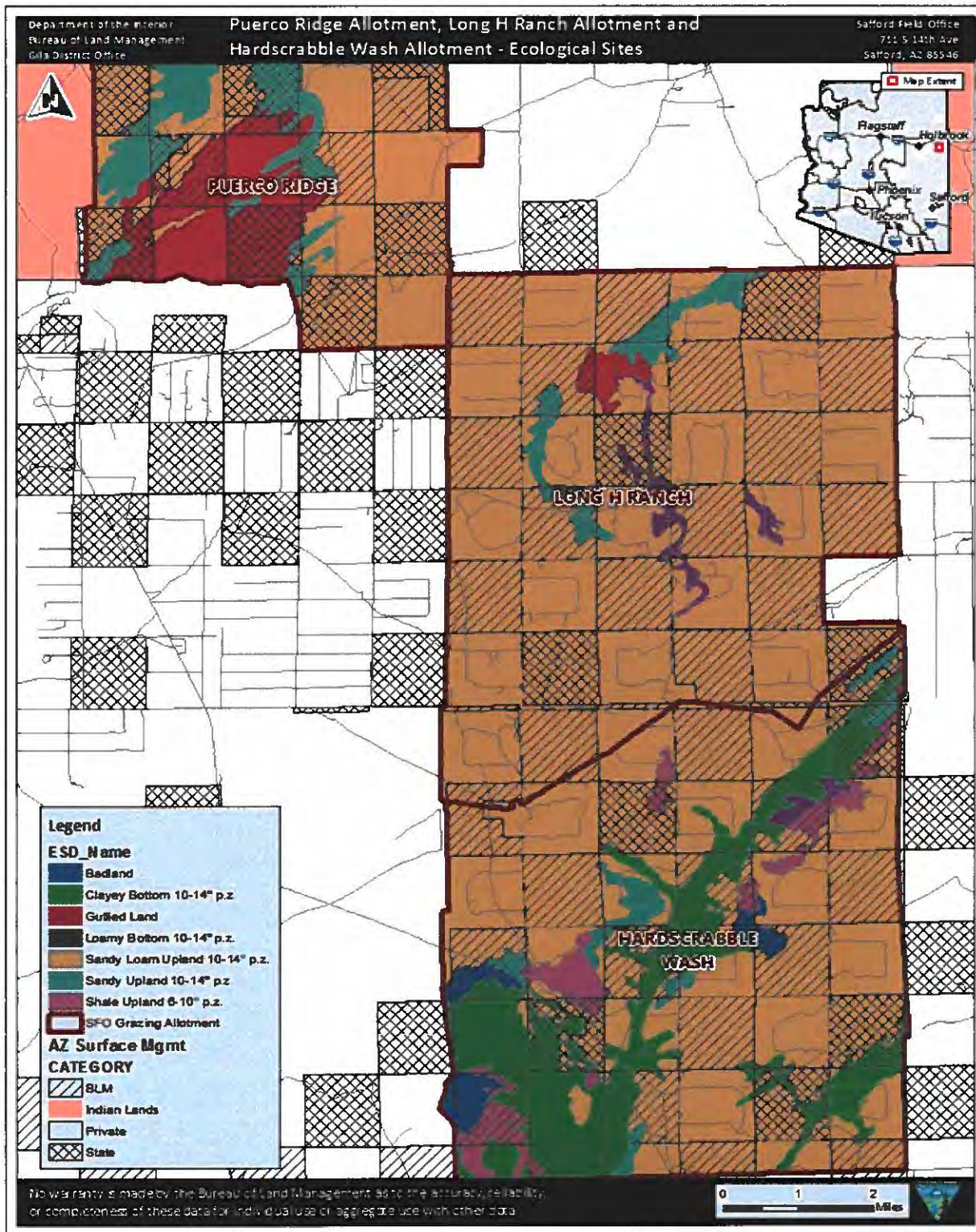
Source: NRCS.

**Table 10. Ecological Sites on the Hardscrabble Wash Allotment**

Ecological Site	Allotment Acres	BLM Acres	BLM Composition
Badland	627	488	5.8%
Clay Loam Wash 10-14" p.z. (R035XA104AZ)	5,395	1,685	20.0%
Loamy Bottom 10-14" p.z. (R035XA112AZ)	168	110	1.3%
Sandy Loam Upland 10-14" (R035XA117AZ)	15,742	5,500	65.4%
Sandy Upland 10-14" p.z. (R035XA118AZ)	668	161	1.9%
Shale Upland 6-10" p.z. (R035XB220AZ)	1,366	471	5.6%

Source: NRCS.

Puerco Ridge Allotment (No. 06176), Long H Ranch Allotment (No. 01781) and Hardscrabble Wash Allotment (No.06110) Draft Land Health Evaluation



**Figure 5. Ecological Sites on the Puerco Ridge Allotment, Long H Ranch Allotment, and Hardscrabble Wash Allotment**

Source: USDI BLM 2017; USDA NRCS 2015

### *Badland*

The NRCS gives Badland a broad description as a landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

### *Gullied land*

The Natural Resources Conservation Service (NRCS) only gives a landform description of Gullied land. The description states that it occurs as gullies, ridges and escarpments.

### *Clay Loam Wash 10-14" p.z. (R035XA104AZ)*

This ecological site occurs within the Major Land Resource Area 35.1 - Colorado Plateau Mixed Grass Plains in northeastern Arizona. Clay Loam Wash 10-14" p.z. occurs in a bottom position on floodplains, valley floors, stream terraces and drainage ways and benefits significantly from run-in moisture from adjacent areas. Fifty to sixty percent of moisture falls as rain Jul-Sep and is the most effective moisture for plant growth. The remaining moisture comes as snow during the winter precipitation ranges from 10-14 inches annually, with elevations ranging from 4,800 to 6,300 feet. Soils are deep to plant root restricting layers. The soil normally can absorb and hold most of the moisture the climate supplies.

The plant community historically (HCPC) found on this site has a plant community characterized as a native mid and short grasses with a relatively small percentage of forbs and shrubs. Grass species found in the Clay Loam Wash 10-14" p.z. include but are not limited to: alkali sacaton, western wheatgrass, blue grama, vine mesquite, and James' galleta. Forb species found include western tansymustard and Rocky Mountain beeplant. Shrub species found include: fourwing saltbush, prairie sagewort, and shadscale saltbush.

### *Sandy Loam Upland 10-14" p.z. (R035XA117AZ)*

This ecological site occurs in Major Land Resource Area 35.1 - the Colorado Plateau Mixed Grass Plains. Elevations range from 4,800 to 6,300 feet and precipitation averages 10 to 14 inches per year. Fifty to sixty percent of moisture falls as rain from July through September and is the most effective moisture for plant growth. The remaining moisture comes as snow during the winter. Long periods with little or no effective moisture are relatively common. Cool season plants begin growth in early spring and mature in the early summer. Warm season plants take advantage of summer rains and grow from July through September.

The reference state plant community is composed primarily of warm season mid-grasses and short grasses with a small percentage of cool season grasses and half-shrubs. Dominant grasses include black grama, blue grama, James' galleta, and alkali sacaton. Other grasses may include Indian ricegrass, squirreltail, needle-and-thread, mat muhly, ring muhly, spike dropseed, sand dropseed, and mesa dropseed. Forbs may include Astragalus species, rose heath, Esteve's pincushion, Cryptantha species, shortstem lupine, threadleaf groundsel, and western aster. Dominant shrubs may include Bigelow sagebrush, fourwing saltbush, Ephedra, and winterfat.

Other shrubs may include *Chrysothamnus* species, rubber rabbitbrush, and broom snakeweed. Common trees include Juniper and Colorado pinyon.

*Sandy Upland 10-14" p.z. (R035XA118AZ)*

This ecological site occurs in Major Land Resource Area 35.1 - the Colorado Plateau Mixed Grass Plains and occurs in an upland position as gently rolling plains and mesas. Slopes range from 0 to 15 percent. Elevations range from 4,800 to 6,700 feet and precipitation averages 10 to 14 inches per year. Fifty to sixty percent of moisture falls as rain from July through September and is the most effective moisture for plant growth. The remaining moisture comes as snow during the winter. Long periods with little or no effective moisture are relatively common. Cool season plants begin growth in early spring and mature in the early summer. Warm season plants take advantage of summer rains and grow from July through September. Soils have characteristics of being deep and well drained plant root restricting layers. Permeability is rapid and the soil can absorb all the moisture the climate supplies but has a very low available water capacity.

The plant communities found on this ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The HCPC on this ecological site has a plant community made up primarily of perennial of cool and warm season grasses with a small percentage of forbs and scattered large and half shrubs.

Dominant grasses include black grama, blue grama, James' galleta, and alkali sacaton. Other grasses may include Indian ricegrass, squirreltail, needle-and-thread, sandhill muhly, spike dropseed, sand dropseed, threeawn, and mesa dropseed. Forbs may include rose heath, *Cryptantha* species, shortstem lupine, small wirelettuce and touristplant. Dominant shrubs may include Bigelow sagebrush, fourwing saltbush, Ephedra, and winterfat. Other shrubs may include *Chrysothamnus* species, rubber rabbitbrush, and broom snakeweed. Common trees include one-seed juniper and two needle pinyon.

*Shale Upland 6-10" p.z. (R035XB220AZ)*

This ecological site occurs in Major Land Resource Area 35.2 - the Colorado Plateau Shrub - Grasslands and occurs in an upland position on gently sloping plains, plateaus, fan remnants, summits, footslopes of mesas and buttes, hill, escarpments and pediments. Elevations range from 3,800 to 5,800 feet. This area has a very dry and windy climate that is hot in the summer and cold in the winter. Average annual precipitation is from 6 to 10 inches. A slight majority of the precipitation arrives during the late fall, winter, and early spring. This winter season moisture originates in the Pacific Ocean and arrives as rain, or sometimes snow, during widespread frontal storms of generally low intensity. The majority of the snow falls from December through February, but rarely lasts more than a few days. The driest period is from late May to early July. Summer rains occur from July through September during brief intense local thunderstorms. The rain is sporadic in intensity and location. Windy conditions are common year-round with the strongest most frequently in the spring.

The HCPC for this ecological site is made up of primarily mid and short grasses with a significant percentage of cold desert shrubs and a few forbs. In the original plant community, there is a mixture of both cool and warm season grasses. Plant species most likely to invade or increase on this site when it deteriorates are saltbushes, broom snakeweed and annuals.

Common grasses in this site include Indian ricegrass, squirreltail, needle-and-thread, James' galleta, alkali sacaton, sixweeks grama, and Madagascar dropseed. Forbs include mealy goosefoot, springparsley, touristplant spectaclepod, nodding buckwheat, divergent buckwheat, and globemallow. Shrub/Vines may include shadscale saltbush, mound saltbush, Whipple cholla, Torrey jointfir, and broom snakeweed.

### **2.3.3 Wildlife**

This section discusses the wildlife resources in and around the Puerco Ridge, Hard Scrabble, and Long H Ranch allotments, including threatened and endangered species (T&E), BLM special status species, and species of economic and recreational importance. Refer to Appendix B: Wildlife for a complete list of species.

#### **2.4.4.1 Threatened and Endangered Species**

The grazing program for the BLM Gila District, including grazing activities within the Puerco Ridge, Hard Scrabble, and Long H Ranch Allotments, was assessed pursuant to Section 7 of the Endangered Species Act (ESA) to determine whether the program would jeopardize the continued existence of an endangered or threatened species and/or their designated or proposed critical habitat. The USFWS rendered a Biological Opinion (BO) on the Gila District Livestock Grazing Program #22410-2006-F-0414 (2012), which determined that there were no T&E species or critical habitat present within the three allotments. Additionally, on April 23, 2021, a generated report using the USFWS Information for Planning and Conservation (IPaC; N.d.) website indicated a total of six Federally listed or proposed species were known or expected to occur within the allotments: gray wolf, yellow-billed cuckoo, northern Mexican gartersnake, monarch butterfly and Zuni bluehead sucker. A species report generated on July 27, 2021 from the AZGFD Environmental Online Review Tool (AZGFD N.d.) indicated that one additional Federally listed species has the potential to occur within five miles of the allotment boundaries and/or within the allotments: the black-footed ferret. Appendix B: Wildlife provides information regarding all wildlife species associated with the Puerco Ridge, Hard Scrabble, and Long H Ranch Allotments.

The IPaC query indicated the gray wolf as being potentially present within the allotments; however, Mexican wolf is the correct common name of *Canis lupus baileyi* and will be referred to as Mexican wolf in this document. This species requires areas with sufficient prey populations, such as deer and elk, and where human-induced mortality is controlled. Current populations are typically associated with evergreen pine-oak woodlands, pinyon juniper woodlands, and mixed-conifer montane forests. The Mexican Wolf Experimental Population Area encompasses Arizona and New Mexico from Interstate 40 south to Mexico. Based on the most current information, species occurrence in Arizona is primarily on eastern/northeastern portions of the Apache-Sitgreaves National Forest, eastern portions of the San Carlos Apache



Reservation, and eastern portions of the Fort Apache Indian Reservation according to the Mexican Wolf Recovery Program Monthly Update from January 2020 (MWIFT 2020). Due to an absence of forested habitat on the BLM-administered portions of the allotments, the Mexican gray wolf is expected to be absent within the jurisdiction of the BLM; however, wolves have been documented within 5 miles of the action area. The Long H Ranch Allotment and Hardscrabble Wash Allotment contain sections of the species' migration corridor between USFS and Tribal lands. Overall, the BLM-administered portions of the allotments lack suitable forested habitat to support Mexican gray wolves but is located within a Mexican wolf experimental population area and may be used by wolves for movement between blocks of suitable habitat.

The yellow-billed cuckoo is a riparian obligate species that utilizes cottonwood gallery forests and may use upland areas for foraging. The allotments do not contain the primary riparian habitat; however, yellow-billed cuckoos may utilize the upland areas temporarily during times of migration. The northern Mexican gartersnake is known to be found in both lotic and lentic habitats including cienegas, stock tanks, and river habitats including pools and backwaters (USDI USFWS 2014). There are no recorded observations of the northern Mexican gartersnake being present within the allotments. The Zuni bluehead sucker is expected to be absent from the BLM-administered portions of the allotments due to the absence of perennial water. See Sections 0 and 0 below for further discussion on riparian-wetland sites. Overall, due to the lack of perennial water sources and riparian habitat, the yellow-billed cuckoo, northern Mexican gartersnake, and Zuni bluehead sucker are expected to be absent from the allotments.

Western populations of the monarch butterfly undergo long-distance migration to the California coast and Baja California to use forest groves sheltered from winds for overwintering and diapause (Southwest Monarch Study 2018; Leong et al. 1995; Van Hook 1996) On return to Arizona, females lay eggs on obligate milkweed host plants, which later serve as a food source for larval offspring. Adult monarchs require a diversity of blooming nectar sources along breeding and migration corridors. Monarchs and milkweed are not known to occur on the allotments. It is possible butterflies could move through the area and utilize junipers as stopover roosts, but habitat is not suitable to support the species for breeding.

The black-footed ferret is associated with native grassland communities and relies solely on prairie dog burrows for shelter and suitable dens to raise their young (USDI USFWS 2017). They are highly specialized predators that rely on prairie dogs for survival, which make up more than 90 percent of their diet (USDI USFWS 2017). Gunnison prairie dogs were noted in the AZGFD report as having the potential to occur in this area based on predicted range models; however, no prairie dogs have been observed on the allotment. Based on the ESDs of this allotment and the results of monitoring data, as described below in Section 6, BLM-administered portions of the allotment contain suitable habitat to support this species if it was present. Due to the lack of their primary prey species and source for burrows, this species is expected to be absent from the allotment.

The northern Aplomado falcon was not listed on either the IPaC or AZGFD species reports; however, in 2006 the entire state of Arizona was designated as part of the 10(j) management area for the species (50 CFR Part 17, 42298-42315). Their habitat consists of open grassland with scattered trees, low ground cover, and elevations from 3,500 to 9,000 feet. They have a very

limited distribution in the U.S. in Texas and New Mexico with their historical range extending into southeastern Arizona; however, the species is still considered to be extirpated from Arizona with no recent records of the species in the state. In Arizona, no documented nesting attempts have occurred since 1940 (AZGFD 2021). Reported observation in 1977 west of Rodeo, New Mexico in Cochise County, Arizona. Sight records since 1940 are unsubstantiated, and the falcon is considered possibly extirpated in Arizona (per conversation with USFWS; AZGFD 2021). There is no designated or proposed critical habitat for this species.

#### **2.4.4.2 BLM Special Status Species**

The BLM sensitive species that have suitable habitat present and are known to exist or have the potential to exist within these allotments are the bald eagle, golden eagle, ferruginous hawk, pinyon jay, Arizona myotis, spotted bat, pale Townsend's big-eared bat, and Gunnison's prairie dog.

A total of five USFWS Birds of Conservation Concern (USDI USFWS 2008) not already addressed as BLM sensitive species have the potential to occur within the allotments and are included in Appendix B: Wildlife. The Birds of Conservation Concern 2008 list considers bird species that are nongame species, gamebirds without a hunting season, subsistence-hunted nongame birds in Alaska, and ESA candidate, proposed, and recently delisted species (USDI USFWS 2008). Data derived from the AZGFD Environmental Online Review Tool (AZGFD N.d.) was used for the migratory bird analysis.

The allotments offer an array of habitats for migratory birds, providing valuable food and cover. Migratory species of concern that have the highest potential to occur on the allotments include several raptor species (i.e., hawks, eagles, owls) and a variety of passerine species. No surveys have been conducted specifically within these allotments for this LHE to determine presence, but these species have the potential of occurring if habitat is available. Bird species utilize the grassland and open shrub habitat for hunting prey. The Gunnison prairie dog utilizes grasslands and open shrub habitat for burrowing and foraging. Bat species may occur on the allotments if roosting habitat is available. Generally, the composition, structure, and distribution of habitat for all classifications of sensitive species are intact and would be suitable for use if the species were present.

#### **2.4.4.3 Species of Economic and Recreational Importance**

Game species within the Puerco Ridge Allotment, Long H Ranch Allotment, and Hardscrabble Wash Allotment include the America pronghorn, scaled quail, mule deer, mountain lion, and mourning dove. Grasslands with dispersed shrub thickets and cacti, as well as grasslands associated with juniper woodlands, offer forage and cover habitat for the pronghorn and mourning dove. Livestock waters allow game species to occupy habitat that would otherwise only be available ephemerally as precipitation allowed.

### **2.1 Special Management Areas**

No Special Management Areas occur within Puerco Ridge, Long H Ranch, and Hardscrabble Wash allotments.

## **2.1 Recreation Resources**

Dispersed recreation activities that may occur on the Puerco Ridge Allotment, Long H Ranch Allotment or Hardscrabble Wash Allotment include small and big game hunting, target shooting, hiking, and off-highway vehicle operation.

## **2.1 Cultural Resources**

Guideline 3-7 of the Arizona Standards and Guidelines states that, "Management practices to achieve desired plant communities will consider protection and conservation of known cultural resources, including historical sites, and prehistoric sites and plants of significance to Native American peoples."

The BLM Safford Field Office Archaeologist George Maloof completed a Class I cultural resources survey on May 24, 2021. During the Class I survey, no archaeological sites, properties of traditional religious or cultural importance (i.e., traditional cultural properties), or sacred sites, were observed or noted.

### 3 Grazing Management

This section discusses the grazing history, permitted use, and terms and conditions on the current lease for the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment.

#### 3.1 Grazing History

Grazing management on the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment consists of grazing on private land, State Trust land, and BLM-administered land. For allotments such as the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment, livestock grazing is authorized by the BLM under Section 15 of the Taylor Grazing Act. The carrying capacity for the whole allotment is not set by the BLM; instead, the lessee is billed for the available forage utilized on public lands only. Figure 1 shows the land status within the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment.

#### 3.1 Current Terms and Conditions for Permitted Use on the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment

Grazing use on the three allotments is in accordance with the terms and conditions of their current term lease. See Tables 11-13 below for a summary of the current permitted use for each allotment.

**Table 11. Current Mandatory Terms and Conditions on the Puerco Ridge Allotment**

Allotment	Number and Kind of Livestock	Season of Use	Percent Public Lands	AUMs
Puerco Ridge (No. 06176)	23 Cattle	March 1 – February 28	100	276

Source: BLM Rangeland Administration System (RAS)

#### Other Terms and Conditions:

- In order to improve livestock distribution on the public lands, all salt blocks and/or mineral supplements shall not be placed within 1/4 mile of any riparian area, wet meadow or watering facility (either permanent or temporary) unless stipulated through a written agreement or decision in accordance with 43 Code of Federal Regulations (CFR) 4130.3-2 (C).
- If in connection with allotment operations under this authorization, any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3048; U.S.C. 3001) are discovered, the Permittee shall stop operations in the immediate area of the discovery, protect the remains and objects, and immediately notify the Authorized Officer of the discovery. The Permittee shall continue to protect the immediate area of the discovery until notified by the Authorized Officer that operations may resume.

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**Table 12. Current Mandatory Terms and Conditions on the Long H Ranch Allotment**

Allotment	Number and Kind of Livestock	Season of Use	Percent Public Lands	AUMs
Long H Ranch (No. 06176)	62 Cattle	March 1 – February 28	100	744

Source: RAS

Other Terms and Conditions:

- None

**Table 13. Current Mandatory Terms and Conditions on the Hardscrabble Wash Allotment**

Allotment	Number and Kind of Livestock	Season of Use	Percent Public Lands	AUMs
Hardscrabble Wash (No. 06110)	62 Cattle	March 1 – February 28	100	744

Source: RAS

Other Terms and Conditions:

- In order to improve livestock distribution on the public lands, all salt blocks and/or mineral supplements shall not be placed within 1/4 mile of any riparian area, wet meadow or watering facility (either permanent or temporary) unless stipulated through a written agreement or decision in accordance with 43 Code of Federal Regulations (CFR) 4130.3-2 (C).
- If in connection with allotment operations under this authorization, any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3048; U.S.C. 3001) are discovered, the Permittee shall stop operations in the immediate area of the discovery, protect the remains and objects, and immediately notify the Authorized Officer of the discovery. The Permittee shall continue to protect the immediate area of the discovery until notified by the Authorized Officer that operations may resume.
- As a term and condition of this permit you are required to submit a report of actual grazing use made on this allotment for the previous grazing period March 1 to Feb. 28. Failure to submit this report by March 1, of this year, may result in suspension or cancellation of grazing permit.
- Grazing fee payment are due on the date specified on the billing notice and must be paid in full within 15 days of the due date, except as otherwise provided in the grazing permit or lease. If payment is not made within that time frame, a late fee (greater of \$25 or 10 percent of the amount owed but not more than \$250) will be assessed.

## **4 Objectives**

This section provides an overview of the Safford Field Office management objectives that are associated with the Puerco Ridge, Long H Ranch, and Hardscrabble Wash allotments per the Phoenix Resource Management Plan (RMP; USDI BLM 1989), as amended by the decision record for Arizona Standards and Guidelines. The Phoenix RMP incorporates by reference the decisions from the Eastern Arizona Grazing Final Environmental Impact Statement (FEIS) Record of Decision (ROD; 1987).

### **4.1 Land Use Plan Management Objectives**

- **Grazing Management (GM-02):** The grazing program in the area is managed under the provisions of the Taylor Grazing Act of 1934, the Federal Land Policy and Management Act of 1976 (FLPMA), and the Public Rangelands Improvement Act of 1978. [Phoenix] RMP page 14-15.
- **GM-03:** Management of rangeland resources is guided by the Range Program Summary (RPS) ROD, which selected the Preferred Alternative analyzed in the 1987 Arizona Grazing FEIS. [Phoenix] RMP page 15.
- **Wildlife/Fisheries (WF-03):** Wildlife and plants which are federally listed or proposed for listing as either threatened or endangered are protected under provisions of the Endangered Species Act of 1973, as amended. [Phoenix] RMP page 15.
- **WF-04:** It is BLM policy to avoid jeopardizing the continued existence of any listed or proposed species and to actively promote species recovery. [Phoenix] RMP page 15.
- **WF-05:** It is BLM policy to manage federal candidate species and their habitat to prevent the need for listing as threatened or endangered. [Phoenix] RMP page 15.

Further, the Phoenix RMP provides the following grazing management objectives: 1) to restore and improve rangeland condition and productivity, 2) to provide for use and development of rangeland, 3) to maintain and improve habitat and viable wildlife populations, 4) to control future management actions and 5) to promote sustained yield and multiple use.

### **4.2 Allotment-Specific Objectives**

The Puerco Ridge, Long H Ranch, and Hardscrabble Wash allotments is subject to the following objectives as established in the Arizona Standards for Rangeland Health.

#### ***4.2.1 Land Health Standards***

The following land health standards are established by the Arizona Standards for Rangeland Health:

##### Standard 1 - Upland Sites

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

##### Standard 2 - Riparian-Wetland Site

Objective: Riparian-wetland areas are in proper functioning condition.

Standard 3 - Desired Resource Conditions

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

**4.2.2 Key Area Objectives**

In grazing administration, a key area is defined as a relatively small portion of a range allotment that is selected due to its location, use, and/or grazing value, and is used as a monitoring point for grazing use. Key areas are indicator areas that reflect what is happening across a larger area as a result of on-the-ground management actions.

A key area should be a representative sample of a large stratum, such as a pasture, grazing allotment, wildlife habitat area, herd management area, and/or watershed area. Although there are multiple ecological sites within the three allotments, established key areas were a representative sample of the majority of each grazing allotment. These locations were chosen because they are representative of the vegetation composition, soils, vegetative production, and overall grazing management on BLM-administered land for each allotment. In 2020, the key area monitoring was conducted by an BLM interdisciplinary (ID) Team made up of a specialist in range, natural resources (wildlife) and hydrology. Key areas were selected within various ecological sites of each allotment, which were established by NRCS.

Addressed in this LHE report are the results from the key area monitoring conducted by the ID Team. Key areas for the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment are presented in Tables 14-16 and Figure 6 below and were used to establish the key area objectives within this LHE report. The key area objectives for the three allotments are to meet the land health standards as established in the Arizona Standards for Rangeland Health. Specific objectives are defined below to guide the determination of whether the land health standards are being met.

**Table 14. Key Area Location of the Puerco Ridge Allotment**

Key Area	Ecological Site	Ecological Site ID	GPS Coordinates
PR-1	Sandy Loam Upland 10-14" p.z.	R035XA117AZ	Latitude – 34.94230 Longitude – -109.43312

Source: USDI BLM 2017, USDA NRCS 2015, BLM ID Team

**Table 15. Key Area Location of the Long H Ranch Allotment**

Key Area	Ecological Site	Ecological Site ID	GPS Coordinates
LH-1	Sandy Upland 10-14" p.z.	R035XA118AZ	Latitude – 34.89506 Longitude – -109.36953
LH-2	Sandy Loam Upland 10-14" p.z.	R035XA117AZ	Latitude – 34.84302 Longitude – -109.40409

Source: USDI BLM 2017, USDA NRCS 2015, BLM ID Team

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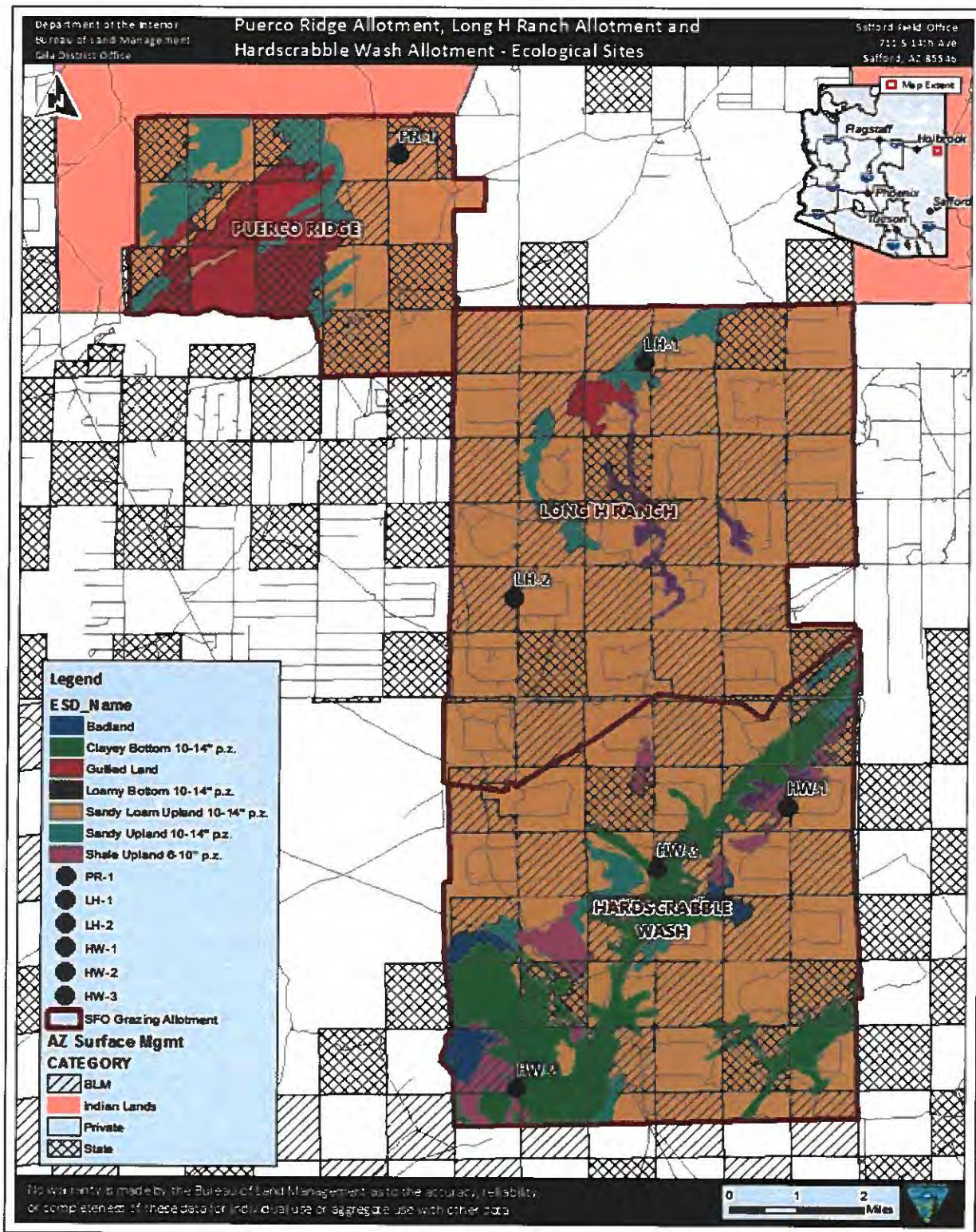
**Table 16. Key Area Locations of the Hardscrabble Wash Allotment**

<b>Key Area</b>	<b>Ecological Site</b>	<b>Ecological Site ID</b>	<b>GPS Coordinates</b>
HW-1	Sandy Loam Upland 10-14" p.z.	R035XA117AZ	Latitude – 34.79589 Longitude – -109.33286
HW-2	Shale Upland 6-10" p.z.	R035XB220AZ	Latitude – 34.73369 Longitude – -109.40466
HW-3	Clay Loam Wash 10-14" p.z.	R035XA104AZ	Latitude – 34.78213 Longitude – -109.36724

Source: USDI BLM 2017, USDA NRCS 2015, BLM ID Team



Puerco Ridge Allotment (No. 06176), Long H Ranch Allotment (No. 01781) and Hardscrabble Wash Allotment (No.06110) Draft Land Health Evaluation



**Figure 6 Key Areas Relative to Ecological Sites on the Puerco Ridge Allotment, Long H Ranch Allotment, and Hardscrabble Wash Allotment**

Source: USDI BLM 2020

**Standard 1 - Upland Sites**

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

Standard 1 indicators are canopy and ground cover, including litter, live vegetation and rock appropriate to the site. Management practices will maintain or promote upland vegetation and other organisms and provide for infiltration and permeability rates, soils moisture storage and soil stability appropriate to the ecological site within the allotments.

**Standard 2 - Riparian-Wetland Site**

Objective: Riparian-wetland areas are in proper functioning condition.

Standard 2 is not applicable because no riparian-wetland habitats exist on BLM-administered lands within the Puerco Ridge Allotment, Long H Ranch Allotment or the Hardscrabble Wash Allotment.

**Standard 3 - Desired Resource Conditions**

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

The DPC objectives are criteria established to evaluate a site's capability of achieving desired resource conditions with consideration for all multiple uses. The DPC objectives are typically specific to the ecological sites within the allotment and also address desired habitat characteristics for the wildlife species likely to be present. As a Section 15 lease, there are limitations to the degree in which the BLM can control or influence plant community changes across the broader allotment. There have been no DPC objectives established for this allotment in the past. The BLM ID Team established DPC objectives based on the ESD reference sheets for Sandy Loam Upland 10-14" p.z. (R035XA117AZ), Sandy Upland 10-14" p.z. (R035XA118AZ), Shale Upland 6-10" p.z. (R035XB220AZ) and Clay Loam Wash 10-14" (R035XA104AZ). Desired resource conditions are based upon the following DPC objectives: plant community composition, bare ground, and litter.

Each ESD reference sheet describes the historic climax plant communities (HCPC) referred to as the reference state, along with a state and transition model (STM). The HCPC represents plant communities that would naturally be able to occur on that site without the influence of disturbances or disturbance patterns that would also naturally occur on the site. Natural disturbances, such as drought, fire, grazing of native fauna, and insects, were inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the site that contribute to the establishment of a dynamic equilibrium that helps to define the different states and transition periods as described in the STM. Some sites may have a small range of variation, while others have a large range. The HCPC of an ecological site is not a precise assemblage of species for which the proportions are the same from place to place or from year to year. In all plant communities, variability is apparent in productivity and occurrence of individual species. Spatial boundaries of the

communities, however, can be recognized by characteristic patterns of species composition, association, and community structure.

Plant communities that are subjected to abnormal disturbances and physical site deterioration or that are protected from natural influences, such as fire and grazing, for long periods seldom resemble the described HCPC. The physical site deterioration caused by the abnormal disturbance results in the crossing of a threshold or irreversible boundary to another state for the ecological site. There may be multiple thresholds and states possible for an ecological site, determined by the type and or severity of abnormal disturbance.

The Plant Community Plant Species Composition table provides a list of species and each species or group of species' annual production in pounds per acre (air-dry weight) expected in a normal rainfall year. Low and high production yields represent the model range of variability for that species or group of species across the extent of the ecological site. The present plant community on an ecological site can be compared to the various common vegetation states that can exist on the site. The STM shows the most common occurring plant communities likely to be encountered on this ecological site. This model may not show every possible plant community, but only those that are most prevalent and observed through field inventory. As more data is collected these plant communities may be revised, removed, and some added to reflect the ecological dynamics of this site.

#### **4.2.4.1 Sandy Loam Upland 10-14" p.z. (R035XA117AZ)**

The reference state, or State 1, gives two communities at which a site could alternate between. The first community details a HCPC site that is a Grassland with Mixed Shrubs (1.1) composed of primarily warm season midgrasses with a small percentage of cool season grasses and some half-shrubs. Dominant grasses include blue grama, black grama, sand dropseed and galleta. Dominant shrubs include fourwing saltbush and Greene's rabbitbrush. Natural climatic variation result in changes in the amount of and ratio of both individual plants and warm season versus cool season plants, especially grasses.

The second community, within State 1, is a Perennial Grassland with Low Shrubs (1.2). This plant community is characterized as a perennial grassland with scattered shrubs. Grasses that are dominant on the site are blue grama, galleta, Indian ricegrass, dropseeds and occasional black grama and needle and thread. The shrub component is mostly low growing small shrubs such as snake weed, Greene's rabbitbrush, mormon tea, fourwing saltbush and occasional winterfat and Bigelow sage. Drought, insect/wildlife herbivory and unmanaged grazing can lead to changes between the two communities.

State 2 is a shrub dominated state, with the general aspect of this site is a mixed shrubland (2.1) that generally reacts to climatic fluctuations and grazing, much like the reference state. State two can have an increase of broom snakeweed, rabbitbrush, Mormon tea and a decrease of fourwing saltbush, winterfat and Bigelow sage. Grasses are dominated by blue grama, galleta and dropseeds with a decline of black grama and cool season grasses. The shrub dominated state has an increase in runoff and bare ground. A shift to this state occurs when there is climatic variation

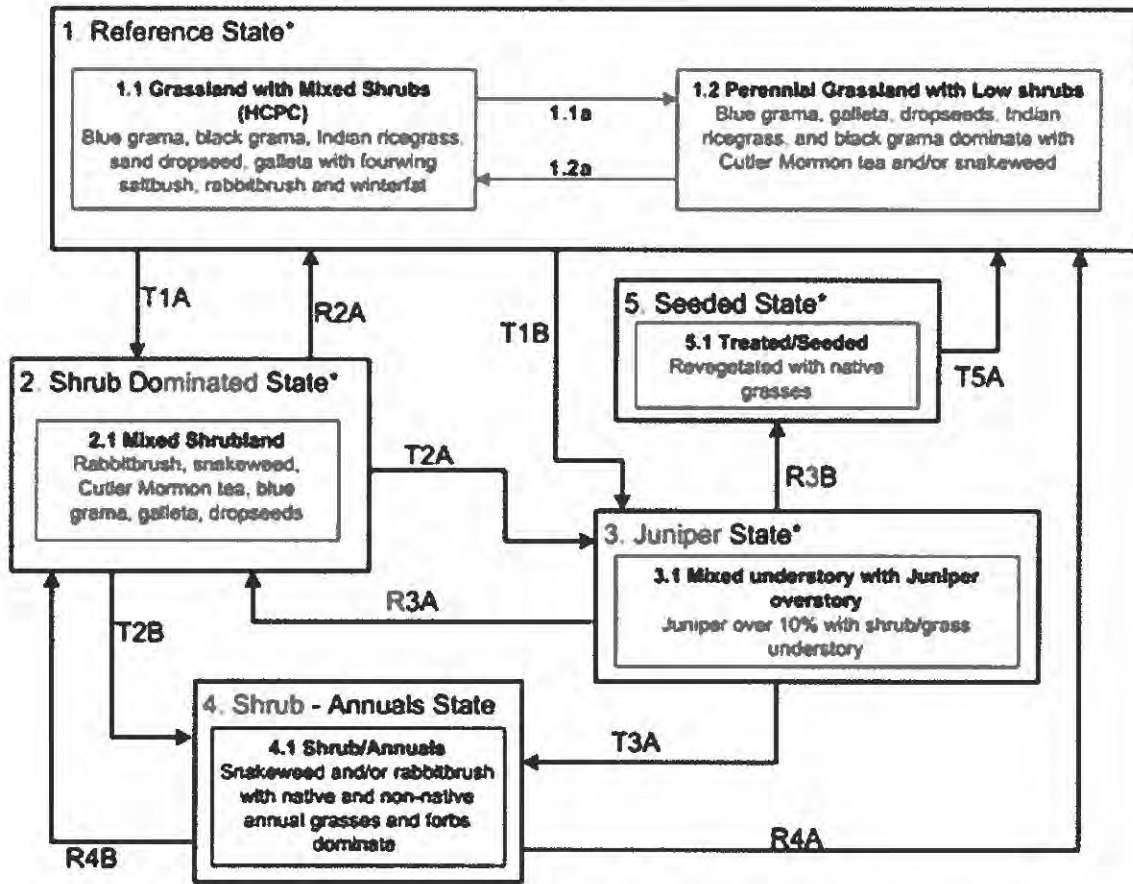
and increase in grazing intensity, and the restoration path is to control woody species and manage grazing.

State 3 describes a general aspect that has an overstory of junipers with half shrubs and succulents. The understory is mostly blue grama and galleta with scattered forbs. Increase runoff and water flow patterns are typical of this state. Exclusion of fire, climatic fluctuation and increased grazing intensity can lead towards the transition of this state. The community of Mixed Understory with Juniper Understory (3.1) is characterized by an increase of juniper canopy greater than 10 percent with an understory of shrubs mainly comprised of half shrubs, Mormon tea and yucca. Grasses consist primarily of blue grama with smaller percentages of galleta and dropseeds. There is an increase in annual forbs. Transition from State 1 to State 3 can be due to unmanaged grazing, establishment of seed source for juniper, lack of fire, climatic conditions favorable for tree regeneration. The restoration path back to State 2 is to reduce tree canopy by mechanical methods or burning; managed grazing and have a favorable climatic conditions.

State 4 describes a general aspect that has a low shrubland with annuals. This state will typically have sites dominate with shrubs and annuals. Within the community Half Shrubs with Annuals (4.1), the plant community is characterized by a dominance of broom snakeweed and rabbitbrush and the other shrubs with a mix of annual forbs. Herbaceous cover is dominated by a mix of annual grasses and forbs. The transition from State 3 to State 4 comes with drought, lack of fire, unmanaged grazing and invasion of nonnative annual species such as cheatgrass, false buffalograss, sixweeks fescue, and Russian thistle. The restoration path is to control woody species, complete invasive weed treatments, range seeding, manage grazing and have favorable climatic conditions.

The last state is State 5 Seeded Grass, that describes a general aspect of grasslands. Within State 5 is the community of Treated and Seeded with Native Grasses (5.1). This plant community is characterized by a dominance of native grasses and can transition back to the reference state or State 1. The composition of the grasses, shrubs and forbs is varied and will depend on the species seeded and/or the seed sources available within the treated areas. The restoration path from State 3 to State 5 is for the sites to have the juniper overstory removed or reduced, introduce prescribed fire, reseed with perennial grasses, managed grazing, and have favorable climatic conditions.

**35.1AZ Sandy Loam Upland 10-14" p.z.  
(R035XA117AZ)  
Draft August 2012**



\*Introduced annuals may or not be present in minor amounts

**Figure 7 Sandy Loam Wash 10-14" p.z. State and Transition Model**  
Source: USDA NRCS 2012

**4.2.4.2 Sandy Upland 10-14" p.z. (R035XA118AZ)**

The reference state gives five plant communities that the site could alternate between. The first community details a site that has a HCPC of Native Grassland with Shrubs (1.1) composed of perennial grasses with a small percentage of forbs and scattered large and half shrubs (USDA NRCS 2012a, p.4 Figure 4). Dominant species include Indian ricegrass, needle and thread, black grama, sand sagebrush, winterfat, fourwing saltbush, and Mormon tea. Trees may be present but are widely scattered. The second community is the Shrubland with Native Grasses (1.2), which describes a plant community that is characterized by a mix of shrubs and well-developed understory of perennial grasses and forbs. Common species include fourwing saltbush, rabbitbrush, sand sagebrush, Indian ricegrass, needle and thread, galleta, dropseed species, blue grama and native grasses. Junipers may be present but occur scattered across the landscape. Shrub canopy is usually less than 25 percent. The third community is Sand Sagebrush with Native Grasses (1.3), which describes a plant community that is characterized by

an increase of sand sagebrush with a well-developed understory of perennial grasses. This plant community phase is maintained by some soil disturbance and sand sage's ability to thrive after surface disturbance. This also includes other shrubs such as rabbitbrush, Mormon tea, sand buckwheat, broom snakeweed, fourwing saltbush and/or other native shrubs. Dominant grasses include Indian ricegrass, blue grama, needle and thread, sand dropseed, sandhill muhly and other native grasses. Shrub canopy is usually less than 25 percent with an occasional scattered juniper. The fourth community is the Active Dunes with Shrubs (1.4), which describes a plant community that is characterized by areas of bare ground with scattered shrubs and grasses. Vegetation is highly variable and tends to be patchy on more active dunes. Shrubs dominate the canopy with species such as sand sagebrush, Mormon tea, dune broom, frosted mint and sand buckwheat. Dominant grasses include Indian ricegrass, sandhill muhly and dropseed spp. Bare ground ranges from 60 to 90 percent with large connected bare areas common.

The fifth community of the reference state is the Grassland with Mormon tea (1.5), which has a plant community that is characterized by a dominance of Mormon tea, Indian ricegrass, blue grama and dropseed spp. This plant community can result from a combination of drought and/or unmanaged grazing. The first transition state following a degree of departure from HCPC is the Sand Sagebrush State. This state lends the site to a Sand Sagebrush Overstory (2.1) with sand sagebrush as the dominant species. Perennial grasses are sub-dominant with scattered forbs and occasional junipers. Species likely to be present are Mormon tea, sand buckwheat, sand dropseed, rabbitbrush, blue grama, sandhill muhly, threeawn, dropseed spp., and galleta. Shrub canopy is usually greater than 25 percent, with sand sagebrush being dominant and most productive. Reduced competition from perennial grasses, increased bare ground, unmanaged grazing and drought conditions favor sand sagebrush persistence. Bare ground ranges between 60 to 80 percent with large connected bare patches common.

The first transition state following a degree of departure from HCPC is the Juniper State (3). This state lends the site to a Juniper Overstory (3.1) that has a plant community of increased juniper canopy greater than 10 percent with a mixed understory. Grass cover is generally low, but forb cover is highly variable depending on climatic events. Bare ground ranges between 50 to 80 percent with large connected bare patches being common. Common herbaceous vegetation includes Indian ricegrass, sandhill muhly, blue grama, sand dropseed and other native grasses. Shrubs include Mormon tea, broom snakeweed, sand sage, rabbitbrush, sand buckwheat along with other native shrubs. Non-native annuals such as cheatgrass and Russian thistle are present along with other introduced annuals.

The second transition state following a degree of departure from HCPC is the Annuals State (4). This state lends the site to Invasive Annual Forbs (4.1) with a plant community characterized by a dominance of non-native and native annual forbs with half shrubs and few annual grasses. Some perennial grasses and forbs may be present in smaller amounts. Russian thistle is the most prevalent annual forb and very productive at this site. Other common annuals include croton, stickweed, woolly plantain, buckwheat spp., wire lettuce, false buffalograss, cheatgrass and scorpionweed.

The HCPC reference state gives multiple pathways for which a site could alternate between the communities. The movement and shifts between communities are influenced by insect/wildlife herbivory, drought, use of and lack of natural fire, increased or decreased soil surface disturbance (soil deposition from wind or water), managed and unmanaged grazing, reseeding, and favorable moisture that supports an increase of large shrubs that provide increased soil stability. The ESD for Sandy Upland lists possible influences for the transition from the reference state to a juniper state. These influences for the establishment of junipers on the site are the reduced competition from perennial grasses and shrubs, lack of fire, unmanaged grazing, juniper seed source available from adjacent sites coupled with increased bare ground to allow for seedling establishment and encroachment. Favorable precipitation may increase seedling establishment even with moderate grass or shrub cover.

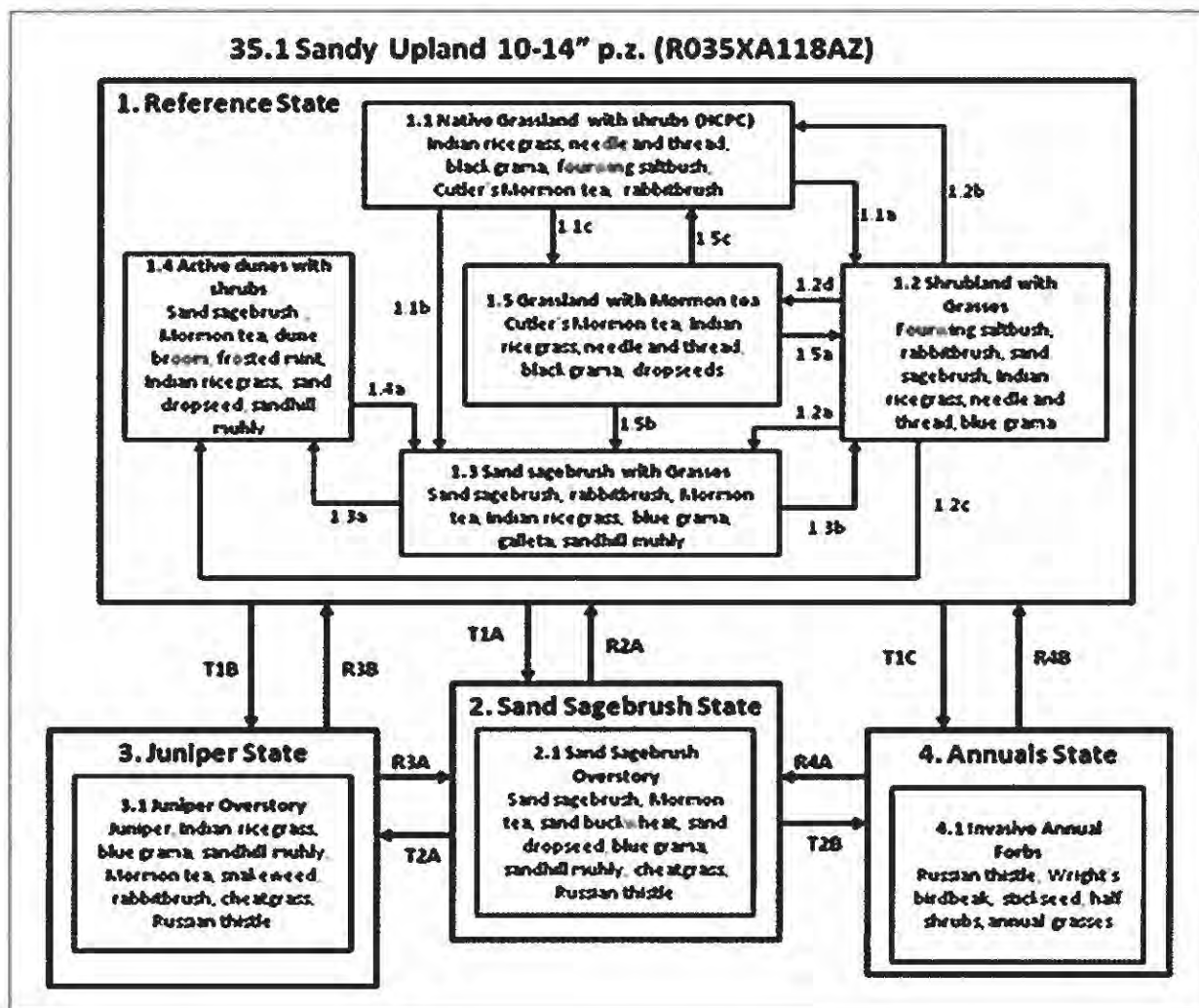


Figure 8 Sandy Upland 10-14" p.z. State and Transition Model  
Source: USDA NRCS 2012

#### **4.2.4.3 Shale Upland 6-10" p.z. (R035XB220AZ)**

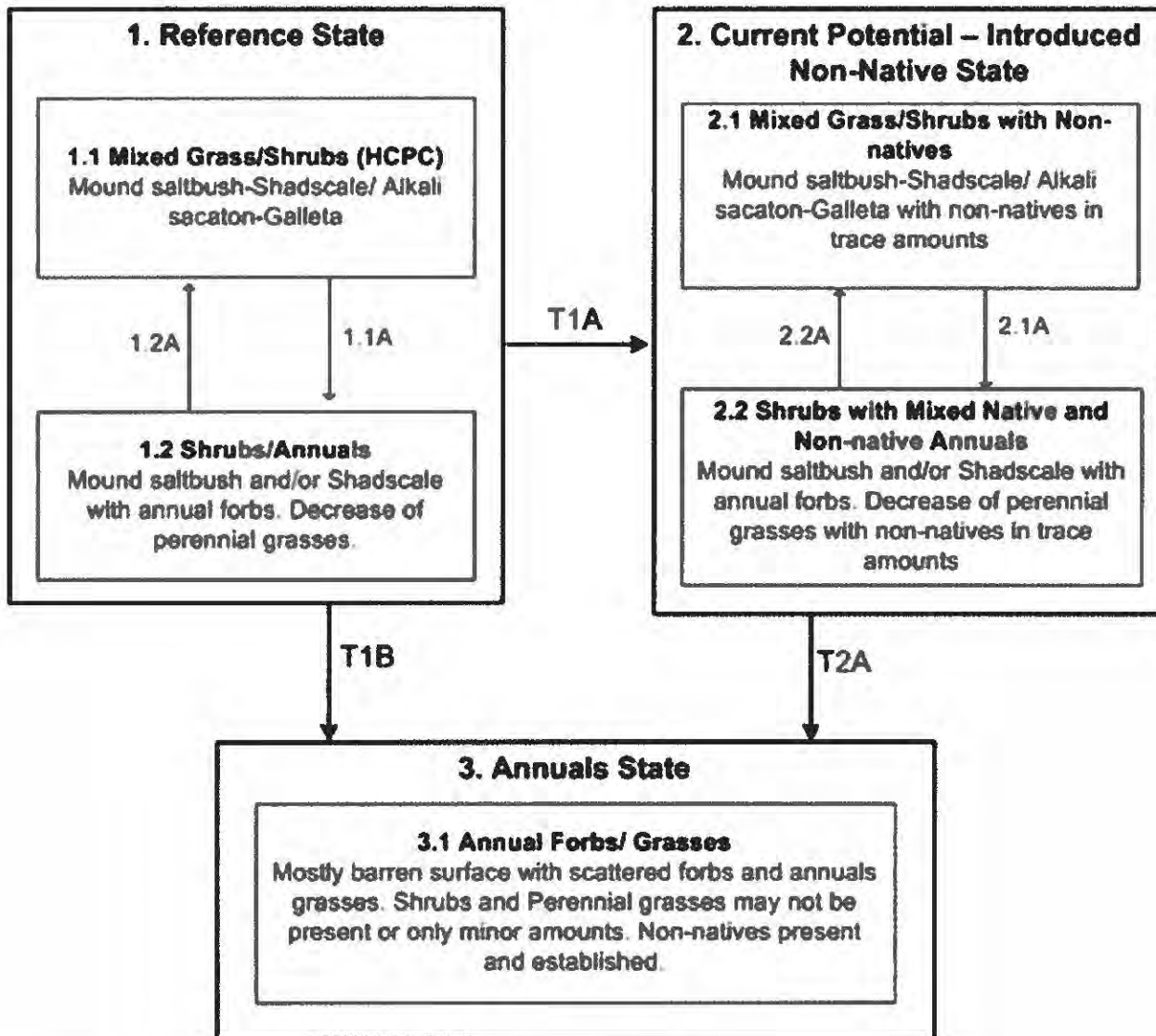
The reference state gives two communities at which a site could alternate between. The first community is the mixed grass/shrubs. This is the HCPC, and it can transition to shrub/annuals communities if there is drought or improper grazing. The shrub/annuals community can transition back to the HCPC when there is favorable wet climate with lack of surface disturbance and prescribed grazing.

The site can transition out of the reference state to Introduced Non-Native State (2) if there is an introduction of non-native annuals. If it transitions to State (2) there are two communities, the state could alternate between. With drought or improper grazing, the site will be dominated by shrubs with a mix native and non-native annual grasses. With above average rainfall the site will be dominated by mixed grasses and shrubs.

The other state that that can be present is the Annual State (3). This both State (1) and State (2) can transition to State (3) if there is severe drought followed by a large storm event, improper grazing, or invasive annuals.



**35.2AZ Shale Upland 6-10" p.z.  
(R035XB220AZ)**



**Figure 9 Shale Upland 6-10" p.z. State and Transition Model**  
Source: USDA NRCS 2012

**4.2.4.4 Clay Loam Wash 10-14" (R035XA104AZ)**

The reference state gives two communities at which a site could alternate between. The first community details a HCPC site with alkali sacaton, western wheatgrass and fourwing saltbush. The second community of HCPC consists of fourwing saltbush, galleta and western wheatgrass. There are two pathways that can influence a site to alternate between communities. The pathway that shifts HCPC from an alkali-dominant site to a fourwing saltbush-dominant site includes

drought, continuous grazing and insect herbivory. The opposite shift within HCPC is due to prescribed grazing, reduced shrub canopy, insect herbivory, drought, fire with grass seed source.

The next state following a degree of departure from HCPC is the Native/Invasive Annuals State. This state had two communities at which a site could alternate between. The first community describes a site with blue grama, alkali sacaton, galleta, rabbitbrush, broom snakeweed and with native and non-native annuals present in small amounts. The second community describes a site with rabbitbrush, broom snakeweed and annuals. This community can also provide for blue grama, galleta, sand dropseed and non-native annuals. There are two pathways that can influence a site to alternate between communities. The first pathway (2.1a) is by continuous, improper grazing and drought, and the second pathway (2.2a) is prescribed grazing, and favorable climate.

The final transition state that has the greatest degree of departure from HCPC is the Eroded/Invaded State (3). This community, Native/Non-native Shrub Invaded (3.1), is characterized by a dominance of shrubs such as salt cedar, greasewood, broom snakeweed, rabbitbrush and/or camelthorn with native and non-native annuals. The influencing transition pathway is the establishment of non-native annuals that create an irreversible change in the plant community. If a Native/Invasive Annuals State transitions, it will move into the Eroded/Invaded State. This transition pathway is influenced by drought, improper grazing management, decline of perennial grass cover and active soil erosion. The Eroded/Invaded State can transition back into the Native/Invasive Annuals State by a transition pathway of prescribed grazing with rest, reseeding, brush management and grade stabilization.

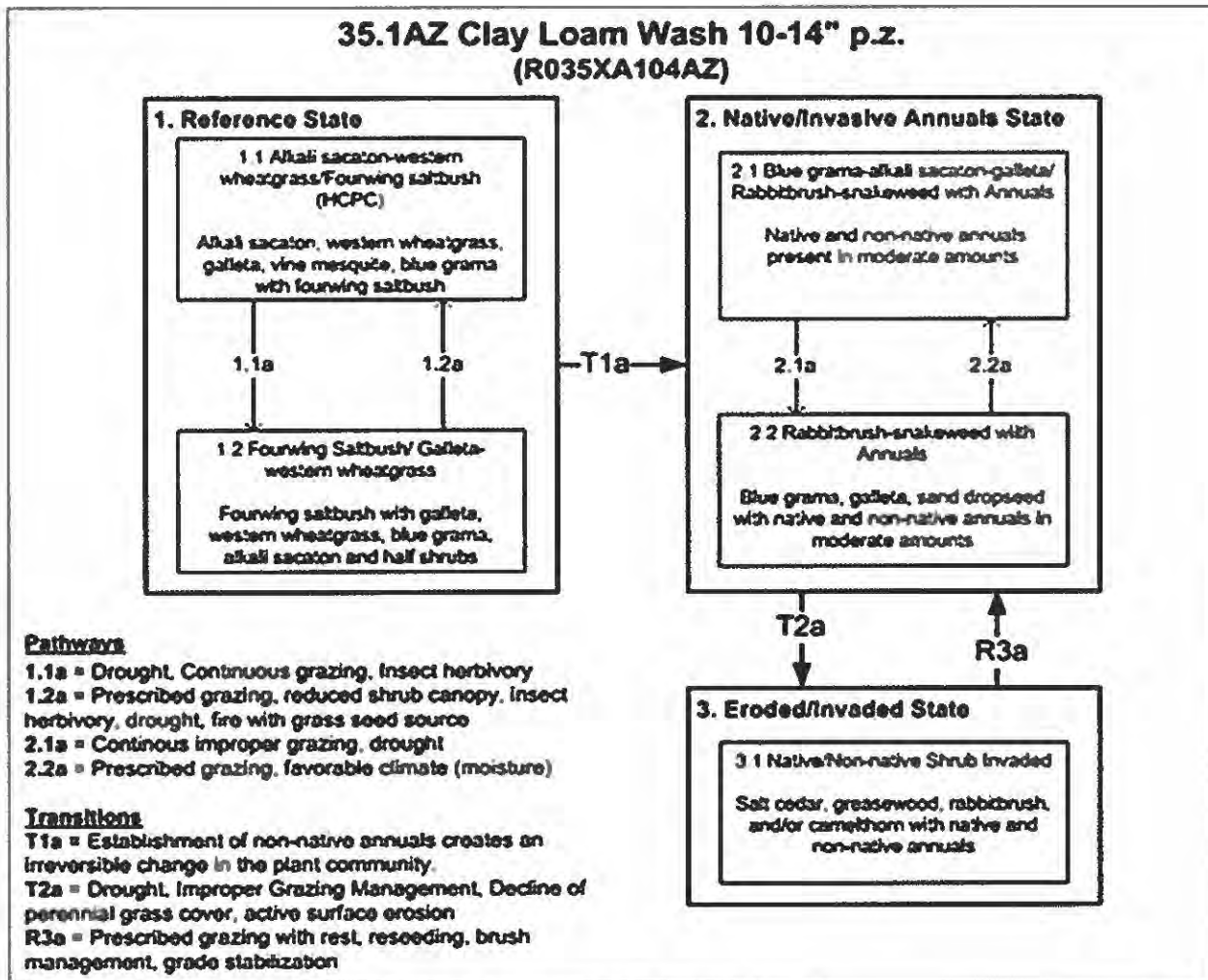


Figure 10 Clay Loam Wash 10-14" p.z. State and Transition Model

Source: USDA NRCS 2012

## 5 Rangeland Inventory and Monitoring Methodology

The Arizona standards for rangeland health were assessed for the three allotments by the BLM ID Team. Documents and publications used in the assessment process include the Web Soil Survey (USDA NRCS 2017), ESDs located within MLRA 35 (USDA NRCS 2009), Interpreting Indicators of Rangeland Health Technical Reference 1734-6, Version 5 (IIRH; USDI BLM 2020), Sampling Vegetation Attributes (USDI BLM 1996), and the National Range and Allotment Handbook (USDA NRCS 2003). A complete list of references is included at the end of this document. All are available for public review in the BLM Safford Field Office. The ID Team used rangeland monitoring data and professional observations to assess conformance with the Arizona standards for rangeland health.

## **5.1 Monitoring Protocol**

Monitoring occurred on the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment. Quantitative measurements for cover and species composition were collected along each transect and were analyzed in conjunction with qualitative indicators of soil and site stability, hydrologic function, and biological integrity. This was completed to assess the existing conditions within the following ecological sites Sandy Loam Upland 10-14" p.z. (R035XA117AZ), Sandy Upland 10-14" p.z. (R035XA118AZ), Shale Upland 6-10" p.z. (R035XB220AZ) and Clay Loam Wash 10-14" (R035XA104AZ). The existing conditions were compared to site specific reference conditions established by the NRCS, which are representative of relatively undisturbed states within a given soil-plant community type. This comparison between existing and reference conditions determines the level of departure from the potential natural community. The key areas were recorded with a global positioning system (GPS) unit using a projection of Web Mercator.

### **5.1 Line Point Intercept**

The method used to obtain transect data pertaining to species composition and soil cover is line point intercept (LPI). This method consists of a horizontal, linear measurement of plant intercepts along the course of a line (tape) 50 meters in length. The LPI method is rapid and accurate for measuring occurrence of grass or grass-like plants, forbs, shrubs, and trees in which vegetation composition is extrapolated. It also quantifies soil cover, including vegetation, litter, rocks, and biotic crusts. These measurements are indicators of wind and water erosion, water infiltration, and the ability of the site to resist and recover from degradation.

### **5.1 Indicators of Rangeland Health**

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

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

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

Step 3. Collect Supplementary Information

Step 4. Rate the 17 Indicators on the Evaluation Sheet

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

1. Soil and Site Stability (S) – The capacity of an area to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water.

2. Hydrologic Function (H) – The capacity of an area to capture, store, and safely release water from rainfall, run-on and snowmelt (when relevant), to resist a reduction in this capacity, and to recover this capacity when a reduction does occur.
3. Biotic Integrity (B) – The capacity of the biotic community to support ecological processes within the normal range of variability expected for the site, to resist a loss in the capacity to support these processes, and to recover this capacity when losses do occur. The biotic community include plants, animals, and microorganisms occurring both above and below ground.

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

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

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

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

## 6 Management Evaluation and Summary of Studies Data

The following information is the evaluation and summary of the Rangeland Health Assessments (RHA) conducted on the Puerco Ridge Allotment, Long H Ranch Allotment, and Hardscrabble Wash Allotment in 2020.

### 6.1 Actual Use

Full permitted AUMs have been implemented on each allotment during the evaluation period totaling 276 AUMs per year for the Puerco Ridge Allotment, 744 AUMs per year for the Long H Ranch Allotment and 744 AUMs per year for the Hardscrabble Wash Allotment.

Livestock grazing for the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment is permitted as a Section 15 grazing lease. Allowable AUMs are calculated on BLM-administered land only. Lease holders are billed for their maximum use available on public lands unless non-use is requested and approved. Non-use by the lessees was not requested during the evaluation period.

### 6.1 Rangeland Health Assessments

The IIRH assessment of the three rangeland attributes was completed at all six key areas (Figure 6). Ratings of Moderate or more are considered to indicate resource concerns for soil erosion, water quantity, and plant productivity. It is important to remember that these ratings are made relative to the potential for the site. For example, a site with highly erodible soils and low potential for stabilizing vegetation may be rated as having a Slight departure from reference conditions even though the actual amount of soil movement is significant, while a site with a high potential for stability rated “Moderate” may have relatively little soil movement.

Monitoring data recorded for the LHE is provided in Appendix A: Monitoring Data. A summary of the IIRH conducted at key areas on the Puerco Ridge Allotment, Long H Ranch Allotment and Hardscrabble Wash Allotment is presented in **Error! Reference source not found.**7 below.

**Table 17. Summary of Range Health Assessment Ratings**

Key Area	Ecological Site	Range Health Attributes – Degree of Departure		
		Soil and Site Stability	Hydrologic Function	Biotic Integrity
PR-1	Sandy Loam Upland 10-14” (R035XA117AZ)	None to Slight	None to Slight	Slight to Moderate
LH-1	Sandy Upland 10-14” (R035XA118AZ)	Slight to Moderate	Moderate	Moderate
LH-2	Sandy Loam Upland 10-14” (R035XA117AZ)	None to Slight	None to Slight	Moderate
HW-1	Sandy Loam Upland 10-14” (R035XA117AZ)	None to Slight	None to Slight	Slight to Moderate
HW-2	Shale Upland 6-10” (R035XB220AZ)	None to Slight	None to Slight	None to Slight
HW-3	Clay loam wash 10-14” (R035XA104AZ)	None to Slight	None to Slight	None to Slight

Source: BLM ID Team 2020

**6.2.1 Sandy Loam Upland 10-14" (R035XA117AZ) 17 Indicators for Key Areas: PR-1, LH-2 and HW-1**

For the 17 indicators of rangeland health, the ecological site reference sheet condition indicates:

1. **Number and extent of rills:** None present on this site. Some minor rills on slopes >5 percent may form due to moderate permeability and moderate runoff characteristics of the soils.
2. **Presence of water flow patterns:** Some water flow patterns may occur on soils that have sandy clay loam or clay loam subsurface textures, if these textures are close to the surface. These soils have moderate permeability and moderate runoff. Water flow patterns on these soils are commonly less than 4 feet long, but may be longer on steeper slopes, generally occupying < 10 percent of the ground cover.
3. **Number and height of erosional pedestals or terracettes:** Pedestals may be common, but short in height (1/2 inch). Terracettes are uncommon. Both may be more developed and especially common during drought, due to high wind erosion hazard of the soils. The moderate permeability and moderate runoff conditions could lead to a few pedestals and terracettes being formed by water erosion.
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, and plant canopy are not bare ground):** Bare ground averages 35 – 45 percent in normal years. Some sites may have biological crusts ranging 0 – 5 percent. Drought may lead to an increase in bare ground.
5. **Number of gullies and erosion associated with gullies:** None.
6. **Extent of wind scoured, blowouts and/or depositional areas:** None. High wind erosion hazard occurs on soils with a surface texture of sandy loam.
7. **Amount of litter movement (described size and distance expected to travel):** Most herbaceous and fine woody litter will be transported by wind and in water flow pathways, while a small percentage stays in place. Coarse woody litter and duff will accumulate under shrub and tree canopies.
8. **Soil surface (top few mm) resistance to erosion (stability values are averages – most sites will show a range of values):** Soil aggregate stability ranges from 4 to 5 under canopy and 2 to 3 in the plant interspaces. A few soils have gravelly surfaces, but most soils do not have any rock fragments. When well vegetated, these soils have a moderate to high resistance to water erosion, but only a low resistance to wind erosion.
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is mostly granular (weak to moderate, fine to medium), but some soil surfaces are platy (weak to moderate, medium to thick). Surface thickness mostly range from 3 to 6 inches but can range between 2 to 10 inches. Color is variable depending on parent material.
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is dominated by perennial grasses with 20 to 40 percent cover, then by evergreen shrubs 15 to 20 percent cover, 1 to 5 percent cover in forbs, and 1 to 2 percent cover in trees in some locations. Both canopy and basal cover values of grasses and some shrubs decrease during prolonged drought. Due to soil textures, slope and vegetative composition, this site is moderately effective at capturing and storing precipitation.

11. **Presence and thickness of compaction layer (usually non; describe soil profile features which may be mistaken for compaction on this site):** None. These soils are not easily compacted. Many of the soils have a weak granular structure.
12. **Functional/Structural Groups:** (List in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to): Dominant: warm season colonizing grasses (20-30 percent)> shrubs; Sub-dominant: shrubs (15-20 percent)> cool season bunchgrasses (5-15 percent)> warm season bunch grasses (5-10 percent) Other: forbs (1-5 percent)> trees (< 2 percent).
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** In a normal year up to 10 percent of grasses and shrubs die off. During and after drought years there can be from 10 to 20 percent die off of shrubs and grasses. Severe winter droughts affect shrubs, trees and cool season grasses the most. Severe summer droughts affect the warm season grasses the most.
14. **Average percent litter cover and depth:** Average percent litter cover 25-40 percent and depth 1/8 inches. Within plant interspaces litter ranges from 10 to 20 percent cover with depths up to 1/8 inch, while under shrub and tree canopies it ranges from 50 to 75 percent cover with depths from 1/8 to 1/2 inches thick.
15. **Expected annual-production (this TOTAL above-ground annual-production, not just forage annual-production):** Average annual production on this site is expected to be 700 to 800 lbs/ac. in a year of average annual precipitation.
16. **Potential invasive (including noxious) species (native and non-native).** List species with BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Broom snakeweed (GUSA2), rabbitbrush (*Chrysothamnus* spp.), false buffalograss (MOSQ) and sixweeks fescue (VUOC) are native to the site, but they have the potential to increase and dominate the site after unmanaged grazing. Utah and oneseed juniper (JUOS and JUMO) and Colorado pinyon (PIED) are native to the site but have the potential to increase and dominate the site after disturbance and/or fire exclusion. Cheatgrass (BRTE) is an exotic grass that has the potential to invade and dominate the site, with or without disturbance. Lambsquarters (CHAL7) and Russian thistle (SATR12) are annual exotic forbs that have the potential to invade and dominate the site after disturbance, especially if the site is near farm fields or disturbed lands.
17. **Perennial plant reproductive capability:** All plants native to this site are adapted to the climate and are capable of producing seeds, stolons and rhizomes except during the most severe droughts.

#### 6.3.4.1 PR-1 Rangeland Health Assessment

The following rangeland health assessments are for the Puerco Ridge Allotment, Key Area PR-1 within the Sandy Loam Upland (R035XA117AZ) ecological site.





**Figure 11. Puerco Ridge Allotment PR-1 Key Area Monitoring photo**

### **Key Area PR-1**

#### **Rangeland Health Attribute 1: Soil and Site Stability**

The ID Team did not observe any signs of erosion or unexpected soil movement/loss based on soils being intact, no compaction layer, and the lack of rills or gullies, water flow patterns, terracettes, pedestals and wind scouring; therefore, all of these indicators were rated as None to Slight. All litter size classes remained at the base of plants with little to no movement and was also rated None to Slight. The soil surface resistance to erosion was measured with an interspace average as 3, and an average of 5 under the canopy. The reference sheet gives a range of 2 to 3 in the interspaces and a range of 4 to 5 under the canopy; therefore, the soil surface resistance to erosion was rated None to Slight. The soil is naturally armored by gravel and all litter size classes were observed to be remaining at the base of plants with little to no movement expected. The presence of bare ground was measured at 16 percent, which is below the reference sheet range of 35 to 45 percent and was rated None to Slight.

Ten indicators for soil and site stability were rated None to Slight; therefore, the overall rating for the Soil and Site Stability attribute is None to Slight.

#### **Rangeland Health Attribute 2: Hydrologic Function**

There were no rills or gullies observed, these indicators were rated None to Slight. Pedestals were uncommon and given a None to Slight rating. Water flow patterns and terracettes were not observed and were rated None to Slight. Bare ground was measured at 16 percent, below the reference sheet range of 35 to 45 percent and was rated None to Slight. Soil surface resistance to erosion was measured with an interspace average as 3 and 5 average under the canopy, within averages of the reference sheet. As the soil remains in place due to it being naturally armored by gravel and no litter movement, soil surface resistance to erosion was rated None to Slight. Soil surface loss or degradation was rated None to Slight as soil remained intact due to natural armoring. Plant community composition did not average near the reference sheet averages as the site's basal cover values were lower. Canopy cover averaged 52 percent, which is within the 37 to 67 percent average in the reference sheet. Basal cover averaged 4 percent, and the reference sheet's average is 15 to 35 percent. The reference sheet states that both cover values, especially canopy cover, decrease during a prolonged drought. Because of the low values of basal cover plant community composition was rated Slight to Moderate. There was no compaction layer, and it was rated None to Slight. Litter amount was measured at 43 percent which was within the reference sheet range and was rated None to Slight.

Nine indicators for Hydrologic Function were rated None to Slight. One indicator for Hydrologic Function was rated Slight to Moderate. Therefore, the overall rating for the Hydrologic Function attribute was rated None to Slight.

### **Rangeland Health Attribute 3: Biotic Integrity**

Soil surface resistance to erosion was measured with an interspace average as 3 and an average of 5 under the canopy, which are within the averages of the reference sheet. As the soil remains in place due to it being naturally armored by gravel and no litter movement, soil surface resistance to erosion was rated None to Slight. Soil surface loss or degradation was rated None to Slight as soils remained intact. Plant functional structure groups were rated Slight to Moderate; grasses dominated the site followed by shrubs, but there was an increase in forbs and juniper. No juniper was intersected within the LPI; however, it was visible outside the LPI on the site. The ESD does not list juniper in any state except for the Juniper State. There was no compaction layer detected and it was rated None to Slight. Plant mortality and decadence was rated None to Slight because there was an even distribution of age classes amongst the vegetation. Litter amount was measured at 43 percent, which was within the reference sheet ranges and was rated None to Slight. Using ocular estimates, it was estimated at 500 pounds per acre for the annual production. The reference sheet describes a range of 325 to 1095 pounds per acre in drought years. This estimate can be further supported by the percent bare ground measuring 16 percent, below the reference sheet range of 35 to 40 percent, despite the repeated drought conditions described in Figure 2, therefore, annual production was rated None to Slight. Invasive plants observed growing on site were juniper, broom snakeweed, and cheatgrass that were scattered throughout the ecological site. Because of the extent of invasive plants present on the site, it was rated Moderate to Extreme. Reproductive capability of perennial plants was rated None to Slight because the native plants are adapted to the climate and capable of reproducing except during the most severe droughts.

Seven indicators for Biotic Integrity were rated as None to Slight. One indicator was rated Slight to Moderate. One indicator was rated Moderate to Extreme. The overall effects of the departures of the Moderate to Extreme and the Slight to Moderate ratings seem to be only slightly affecting

the overall site functionality with consideration to the other None to Slight indicators. Therefore, the overall rating for the Biotic Integrity attribute was rated Slight to Moderate.

### 6.3.4.2 LH-2 Rangeland Health Assessment

The following rangeland health assessments are for the Long H Ranch Allotment, Key Area LH-2 within the Sandy Loam Upland 10-14" (R035XA117AZ) ecological site.

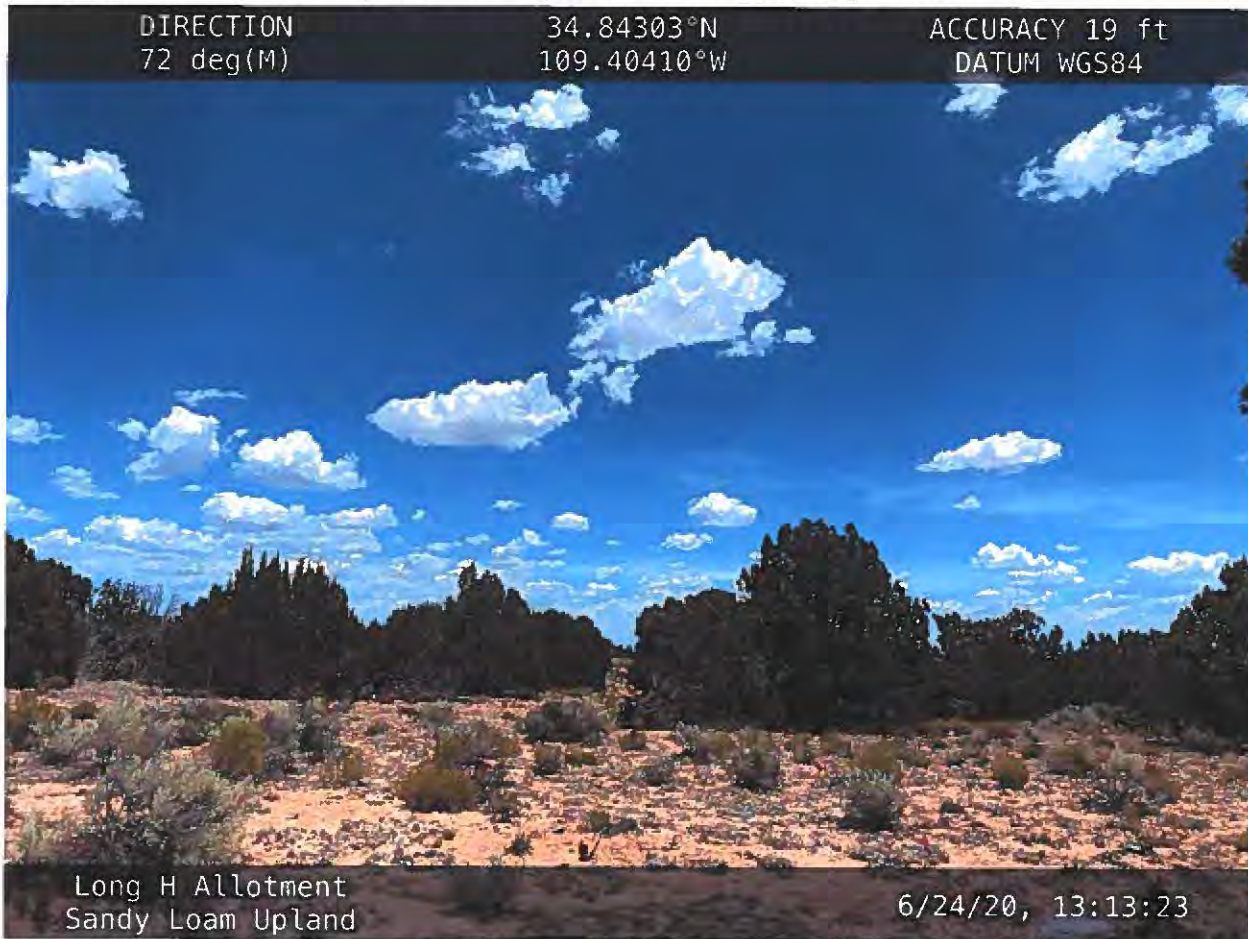


Figure 12. Long H Ranch Allotment LH-2 Key Area Monitoring photo

#### Key Area LH-2

##### Rangeland Health Attribute 1: Soil and Site Stability

The ID Team did not observe any signs of erosion or unexpected soil movement/loss based on soils being intact, no compaction layer, and the lack of rills or gullies, water flow patterns, terracettes, pedestals and wind scouring; therefore, all of these indicators were rated as None to Slight. All litter size classes remained at the base of plants with little to no movement and was also rated None to Slight. The soil surface resistance to erosion was measured with an interspace average as 3, and an average of 4 under the canopy. The reference sheet gives a range of 2 to 3 in the interspaces and a range of 4 to 5 under the canopy; therefore, the soil surface resistance to erosion was rated None to Slight. The soil is naturally armored by gravel and all litter size classes were observed to be remaining at the base of plants with little to no movement expected.

The presence of bare ground was measured at 46 percent, which is close to the reference sheet range of 35 to 45 percent and was rated None to Slight.

Ten indicators for Soil and Site Stability were rated None to Slight. Therefore, the overall rating for the Soil and Site Stability attribute is None to Slight.

### **Rangeland Health Attribute 2: Hydrologic Function**

There were no rills or gullies observed, these indicators were rated None to Slight. Pedestals were uncommon and given a None to Slight rating. Water flow patterns and terracettes were not observed and were rated None to Slight. Bare ground was measured at 46 percent, close to the reference sheet range of 35 to 45 percent and was rated None to Slight. Soil surface resistance to erosion was measured with an interspace average as 3 and 4 average under the canopy, within averages of the reference sheet. As the soil remains in place due to it being naturally armored by gravel and no litter movement, soil surface resistance to erosion was rated None to Slight. Soil surface loss or degradation was rated None to Slight as soil remained intact due to natural armoring. Plant community composition did not average near the reference sheet averages as the site's basal cover and canopy cover values were lower. Canopy cover averaged 24 percent, which is below the 37 to 67 percent average in the reference sheet. Basal cover averaged 6 percent, and the reference sheet's average is 15 to 35 percent. The reference sheet states that both cover values, especially canopy cover, decrease during a prolonged drought. Because of the low values of canopy cover and basal cover the plant community composition was rated Slight to Moderate. There was no compaction layer detected and it was rated None to Slight. Litter amount was measured at 34 percent which was within the reference sheet range of 25 to 40 and was rated None to Slight.

Nine indicators for Hydrologic function were rated None to Slight. One indicator for Hydrologic functions were rate Slight to Moderate. Therefore, the overall rating for the Hydrologic function attribute was rated None to Slight.

### **Rangeland Health Attribute 3: Biotic Integrity**

Soil surface resistance to erosion was measured with an interspace average as 3 and 4 average under the canopy, within averages of the reference sheet. As the soil remains in place due to it being naturally armored by gravel and no litter movement, soil surface resistance to erosion was rated None to Slight. Soil surface loss or degradation was rated None to Slight as soils remained intact. Plant functional structure groups were rated Moderate to Extreme, as juniper dominated the site and is consider a minor group within the reference sheet. There was no compaction layer, and it was rated None to Slight. Plant mortality and decadence was rated None to Slight because there was an even distribution of age classes amongst the vegetation. Litter amount was measured at 34 percent which was within the 25 to 40 reference sheet range and was rated None to Slight. Using ocular estimates, it was estimated at 400 pounds per acre for the annual production. The reference sheet describes a range of 325 to 1095 pounds per acre therefore, annual production was rated None to Slight. Invasive plants were observed growing on site were the dominant juniper and broom snakeweed that was scattered throughout the ecological site. Because juniper cover was listed at 5 percent on the reference sheet and the sites juniper cover was listed at 14 percent, it was rated Moderate to Extreme. The reproductive capability of perennial plants was rated None to Slight because the native plants are adapted to the climate and capable of reproducing except during the most severe droughts.

Seven indicators for Biotic Integrity were rated as None to Slight. Two indicators were rated Moderate to Extreme. The overall effects of the departures of the two Moderate to Extreme ratings were found by the ID Team to be only moderately affecting the overall site functionality with consideration to the other None to Slight indicators. Therefore, the overall rating for the Biotic Integrity attribute is Moderate.

### 6.3.4.3 HW-1 Rangeland Health Assessment

The following rangeland health assessments are for the Hardscrabble Wash Allotment, Key Area HW-1 within the Sandy Loam Upland 10-14" (R035XA117AZ) ecological site.



Figure 13. Hardscrabble Wash Allotment HW-1 Key Area Monitoring Photo

#### Key Area HW-1

##### Rangeland Health Attribute 1: Soil and Site Stability

The ID Team did not observe any signs of erosion or unexpected soil movement/loss based on soils being intact, no compaction layer, and the lack of rills or gullies, water flow patterns, terracettes, pedestals and wind scouring; therefore, all of these indicators were rated as None to Slight. All litter size classes remained at the base of plants with little to no movement and was also rated None to Slight. The soil surface resistance to erosion was measured with an interspace average as 4, and an average of 6 under the canopy. The reference sheet gives a range of 2 to 3 in the interspaces and a range of 4 to 5 under the canopy; therefore, the soil surface resistance to

erosion was rated None to Slight. The soil is naturally armored by gravel and all litter size classes were observed to be remaining at the base of plants with little to no movement expected. The presence of bare ground was measured at 30 percent, which is within the reference sheet range of 35 to 45 percent and was rated None to Slight.

Ten indicators for Soil and Site Stability were rated None to Slight. Therefore, the overall rating for the Soil and Site Stability attribute is None to Slight.

### **Rangeland Health Attribute 2: Hydrologic Function**

There were no rills or gullies observed, these indicators were rated None to Slight. Pedestals were uncommon and given a None to Slight rating. Water flow patterns and terracettes were not observed and were rated None to Slight. Bare ground was measured at 46 percent, close to the reference sheet range of 35 to 45 percent and was rated None to Slight. Soil surface resistance to erosion was measured with an interspace average as 4 and 6 average under the canopy, better than the averages of the reference sheet. As the soil remains in place due to it being naturally armored by gravel and no litter movement, soil surface resistance to erosion was rated None to Slight. Soil surface loss or degradation was rated None to Slight as soil remained intact due to natural armoring. Plant community composition did not average near the reference sheet averages as the site's basal cover values were lower. Canopy cover averaged 44 percent, which is within the 37 to 67 percent average in the reference sheet. Basal cover averaged 12 percent, below the reference sheet's average of 15 to 35 percent. The reference sheet states that both cover values, especially canopy cover, decrease during a prolonged drought. Because of the low values of basal cover, plant community composition was rated Slight to Moderate. There was no compaction layer detected and it was rated None to Slight. Litter amount was measured at 30 percent which was within the reference sheet range of 25 to 40 percent and was rated None to Slight.

Nine indicators for Hydrologic Function were rated None to Slight. One indicator for Hydrologic Functions were rate Slight to Moderate. Therefore, the overall rating for the Hydrologic Function attribute was rated None to Slight.

### **Rangeland Health Attribute 3: Biotic Integrity**

Soil surface resistance to erosion was measured with an interspace average as 4 and 6 average under the canopy, above the averages of the reference sheet. As the soil remains in place due to it being naturally armored by gravel and no litter movement, soil surface resistance to erosion was rated None to Slight. Soil surface loss or degradation was rated None to Slight as soils remained intact. Plant functional structure groups were rated Slight to Moderate, as juniper is the sub dominant group on the site and is consider a minor group of the ecological site. There was no compaction layer detected and was rated None to Slight. Plant mortality and decadence was rated None to Slight because there was an even distribution of age classes amongst the vegetation. Litter amount was measured at 30 percent which was within the reference sheet range of 25 to 40 percent and was rated None to Slight. Using ocular estimates, it was estimated at 400 pounds per acre for the annual production. The reference sheet describes a range of 325 to 1095 pounds per acre therefore, annual production was rated None to Slight. Invasive plants were observed growing on site were juniper which dominated and broom snakeweed that was scattered throughout the ecological site. Because of the invasive plants present on the site, it was rated Moderate to Extreme. Reproductive capability of perennial plants was rated None to Slight

because the native plants are adapted to the climate and capable of reproducing except during the most severe droughts.

Seven indicators for Biotic Integrity were rated as None to Slight. One indicator was rated Slight to Moderate, and one indicator was rated Moderate to Extreme. The overall effects of the departures of the Moderate to Extreme and the Slight to Moderate ratings were found by the ID Team to be only slightly affecting the overall site functionality with consideration to the other indicators. Therefore, the overall rating for the Biotic Integrity attribute is Slight to Moderate.

### **6.2.2 Sandy Upland 10-14" (R035XA118AZ) 17 Indicators for Key Area: LH-1**

For the 17 indicators of rangeland health, the ecological site reference sheet condition indicates:

1. **Number and extent of rills:** None. The sandy surface textures and well drained nature of the soils should preclude the presence of rills.
2. **Presence of water flow patterns:** A very few scattered water flow patterns may be present on steepest slopes. Water Flow patterns on these soils are commonly 1 to 2 meters long, generally occupying < 5 percent of the ground cover.
3. **Number and height of erosional pedestals or terracettes:** Uncommon. If present pedestals typically less than 1" in height often associated with deposition areas and water flow patterns. Terracettes are absent. This site has potential for significant development of biological crust. Well-developed biological crust should not be confused with pedestals.
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, and plant canopy are not bare ground):** Bare ground averages 35 to 55 percent. Drought may cause an increase in bare ground.
5. **Number of gullies and erosion associated with gullies:** None.
6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind scoured areas, blowouts, and/or depositional areas are mostly uncommon in well vegetated herbaceous plant communities (1.1 and 1.2). However, in certain plant communities (1.3 and 1.4) some deposition and wind scour may occur, especially during droughts, due to high wind erosion hazard of the soil. Sites dominated by sand sage and juniper are most likely to suffer from excessive blowouts and depositions.
7. **Amount of litter movement (described size and distance expected to travel):** Most herbaceous and fine woody litter will be transported by wind and in water flow pathways, while a small percentage stays in place. Coarse woody litter and duff will accumulate under shrub and tree canopies.
8. **Soil surface (top few mm) resistance to erosion (stability values are averages – most sites will show a range of values):** Expected soil aggregate stability ranges from 2 to 4. Under canopies the range is 3 to 4 and 2 to 3 in the interspaces. When well vegetated, these soils have a moderate to high resistance to water erosion, but only a low resistance to wind erosion.
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is loose granular, with a weak physical crust. Surface thickness range from 3 to 6 inches. Color is variable depending on parent material.
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This grassland community

consists of about 70 percent grasses, 25 percent shrubs and 5 percent composition of forbs and promotes infiltration and reduces runoff.

11. **Presence and thickness of compaction layer (usually non; describe soil profile features which may be mistaken for compaction on this site):** None.
12. **Functional/Structural Groups:** (List in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to): Dominant: cool season grasses (35-45 percent) > warm season grasses (30-40 percent); Sub-dominant: shrubs (15-25 percent) Other: Forbs (5-10 percent) > Trees (1-5 percent).
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** In a normal year up to 10 percent of grasses and shrubs die off. During and after drought years there can be from 10 to 20 percent die off of shrubs and grasses. Severe winter droughts affect shrubs, trees and cool season grasses the most. Severe summer droughts affect the warm season grasses the most.
14. **Average percent litter cover and depth:** Within plant interspaces litter ranges from 10 to 20 percent cover, while under shrub and tree canopies it ranges from 25 to 60 percent cover with depths from 1/8 to 1/4 inch thick.
15. **Expected annual-production (this TOTAL above-ground annual-production, not just forage annual-production):** 250-350 pounds per acre (dry weight) in drought years, 450-550 pounds per acre in normal years, 600-700 pounds per acre in wet years.
16. **Potential invasive (including noxious) species (native and non-native).** List species with BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Mormon tea, broom snakeweed, sand sagebrush and rabbitbrush are all native to the site but have the ability to increase and dominate the area after disturbance. Oneseed juniper (JUMO) is native to the site but has the ability to increase and dominate the site after unmanaged grazing and/or fire exclusion. Introduced annuals that have the ability to increase and dominate the site after unmanaged grazing and/or ground disturbance include cheatgrass and Russian thistle.
17. **Perennial plant reproductive capability:** All plants native to this site are adapted to the climate and are capable of producing seeds, stolons and rhizomes except during the most severe droughts.

#### 6.2.2.1 LH-1 Rangeland Health Assessment

The following rangeland health assessments are for the Long H Ranch Allotment, Key Area LH-1 within the Sandy Upland 10-14" (R035XA118AZ) ecological site.





Figure 13. Long H Ranch Allotment LH-1 Key Area Monitoring Photo

### Key Area LH-1

#### Rangeland Health Attribute 1: Soil and Site Stability

The ID Team did not observe any signs of erosion or unexpected soil movement/loss based on soils being intact, no compaction layer, and the lack of rills or gullies, terracettes, pedestals and wind scouring; therefore, all of these indicators were rated as None to Slight. There was water flow patterns that were frequent throughout and it was rated Moderate. The reference sheet states water flow patterns on these soils are commonly 1 to 2 meters long, generally occupying less than 5 percent of the ground cover. The water flow patterns were longer than 2 meters and greater than 5 percent. All litter size classes remained at the base of plants with little to no movement and was also rated None to Slight. The soil surface resistance to erosion was measured with an interspace average as 5, and an average of 6 under the canopy. The reference sheet gives a range of 2 to 3 in the interspaces and a range of 3 to 4 under the canopy; therefore, the soil surface resistance to erosion was rated None to Slight. The soil is naturally armored by gravel and all litter size classes were observed to be remaining at the base of plants with little to no movement expected. The presence of bare ground was measured at 22 percent, which is below the reference sheet range of 35 to 55 percent and was rated None to Slight.

Nine indicators for soil and site stability were rated None to Slight. One indicator was rated Moderate. Therefore, the overall rating for the soil and site stability attribute is Slight to Moderate.

### **Rangeland Health Attribute 2: Hydrologic Function**

There were no rills or gullies observed, these indicators were rated None to Slight. Pedestals and terracettes were uncommon and was rated None to Slight. Water flow patterns were observed and were frequent throughout and was rated Moderate. Bare ground was measured at 22 percent, less than the reference sheet range of 35 to 55 percent, therefore it was rated None to Slight. Soil surface resistance to erosion was measured with an interspace average as 5 and 6 average under the canopy, above the averages of the reference sheet. Soil surface resistance to erosion was rated None to Slight, as the soil remains in place due to being naturally armored by gravel and all litter size classes remained at the base of plants with little to no movement. Soil surface loss or degradation was rated None to Slight as soil remained intact due to natural armoring. The ID Team observed juniper as the dominant species at this site, occurring more than the reference sheet's 1 to 5 percent range for trees. The canopy cover was measured at 70 percent, and basal cover at 8 percent. The canopy cover that was observed on site consisted of 42 percent juniper, 20 percent perennial grasses, and 8 percent shrubs. The reference sheet did not give a range for canopy cover but it did give a range for basal which is 3 to 23 percent. Basal cover was measured at 8 percent and was within the range of the reference sheet. Because of the dominance of juniper on site the and the increased water flow patterns next to the juniper, plant community composition was rated Moderate. There was no compaction layer detected and it was rated None to Slight. Litter amount was measured at 52 percent which was above the reference sheet range which is 20 to 35 percent and was rated None to Slight.

Eight indicators for Hydrologic Function were rated None to Slight. Two indicators for Hydrologic Function were rate Moderate. Therefore, the overall rating for the Hydrologic Function attribute was rated Moderate.

### **Rangeland Health Attribute 3: Biotic Integrity**

Soil surface resistance to erosion was measured with an interspace average as 5 and an average of 6 under the canopy, which are above the averages of the reference sheet of 3 to 4 under canopy and 2 to 3 in the interspaces. Soil surface resistance to erosion was rated None to Slight, as the soil remains in place due to being naturally armored by gravel and all litter size classes remained at the base of plants with little to no movement. Soil surface loss or degradation was rated None to Slight as soils remained intact. Plant functional structure groups were rated Moderate to Extreme, as juniper dominated the site and is consider a minor group of the ecological site. The canopy cover that was observed on site consisted of 42 percent juniper, 20 percent perennial grasses, and 8 percent shrubs. The reference sheet listed that grasses should make the greatest percent of composition. There was no compaction layer, and it was rated None to Slight. Plant mortality and decadence was rated None to Slight because there was an even distribution of age classes amongst the vegetation. Litter amount was measured at 52 percent which was above the reference sheet range at 20 to 35 percent and was rated None to Slight. Using ocular estimates, it was estimated at 400 pounds per acre for the annual production. The reference sheet describes a range of 330 to 670 pounds per therefore annual production was rated None to Slight. Invasive plants were observed growing on site including were juniper which dominated and broom snakeweed that was scattered throughout the ecological site. Because of

the density of juniper along with snakeweed and loco weed in the surrounding area, the indicator for invasive plants was rated Moderate to Extreme. Reproductive capability of perennial plants was rated None to Slight because the native plants are adapted to the climate and capable of reproducing except during the most severe droughts.

Seven indicators for Biotic Integrity were rated as None to Slight. Two indicators were rated Moderate to Extreme. The overall effects of the departures of the two Moderate to Extreme ratings seem to be only moderately affecting the overall site functionality with consideration to the other indicators rated None to Slight. Therefore, the overall rating for the Biotic Integrity attribute is Moderate.

### ***6.2.3 Shale Upland 6-10" (R035XB220AZ) 17 Indicators for Key Area: HW-2***

For the 17 indicators of rangeland health, the ecological site reference sheet condition indicates:

1. **Number and extent of rills:** Somewhat common, especially on steepest slopes. Rills less than 10 feet long due to fine-textured soils and scattered perennial plant cover. Sites armored with coarse fragments (gravels and channers) will have shorter rills and less frequent.
2. **Presence of water flow patterns:** Somewhat common throughout site. Water flow patterns may be long with low sinuosity and connected on steeper slopes. On sites armored with coarse fragments will have less evidence of flow patterns, but still common. Water flow patterns will show some signs of deposition.
3. **Number and height of erosional pedestals or terracettes:** Some long-lived plants may show some slight pedestals of less than a ½" on slopes. Terracettes are few.
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, and plant canopy are not bare ground):** Expected bare ground range 25-50 depending on surface fragments. Well developed, intact biological crust should not be counted as bare ground.
5. **Number of gullies and erosion associated with gullies:** None to very few. When site is well vegetated and covered with rock fragments gullies are stable and will only show minor signs of active erosion.
6. **Extent of wind scoured, blowouts and/or depositional areas:** Deposition and blowouts by wind are not expected.
7. **Amount of litter movement (described size and distance expected to travel):** Litter movement or redistribution by water is common and expected in water flow patterns. Some litter removal in water flow patterns is expected.
8. **Soil surface (top few mm) resistance to erosion (stability values are averages – most sites will show a range of values):** The expected average soil stability is 3 or 4. Surface fragments, litter, and vegetation cover aid in reducing erosion.
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface horizon is 2 to 4 inches deep. Structure is mostly weak thin platy parting to moderate very fine granular structure. See specific soil survey for additional site information.
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by a relatively even distribution of perennial grasses with scattered half-shrubs and is well

distributed across the site and lends to slowing runoff and allowing for moderate infiltration.

11. **Presence and thickness of compaction layer (usually non; describe soil profile features which may be mistaken for compaction on this site):** None.
12. **Functional/Structural Groups:** (List in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>>, >, = to indicate much greater than, greater than, and equal to): Dominant: Warm season perennial grasses (Alkali sacaton and galleta) > Salt tolerant Shrubs (Mound saltbush and Shadscale saltbush); Sub-dominant: Cool season perennial grasses > other half-shrubs > forbs
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All plant functional groups are adapted to survival in all but the most severe droughts. Severe winter droughts affect the shrubs the most. Severe summer droughts affect grasses the most.
14. **Average percent litter cover and depth:** Herbaceous litter is not persistent on the site.
15. **Expected annual-production (this TOTAL above-ground annual-production, not just forage annual-production):** The expected annual total production in an average year is 125 – 175 lbs/ac.
16. **Potential invasive (including noxious) species (native and non-native).** List species with BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Mound saltbush, annual buckwheats, scorpionweed and whitestem blazingstar are native to the site but may have the potential to increase with continued disturbance. Cheatgrass, annual wheatgrass, and Russian thistle are non-native annuals that have the potential to invade the site with or without disturbance.
17. **Perennial plant reproductive capability:** All plants native to the site are adapted to the climate and are capable of producing seeds, stolons, and/or rhizomes during the most severe droughts.

### 6.2.3.1 HW-2 Rangeland Health Assessment

The following rangeland health assessments are for the Hardscrabble Wash Allotment, Key Area HW-2 within the Shale Upland 6-10" (R035XB220AZ) ecological site.



Figure 14. Hardscrabble Wash Allotment HW-2 Key Area Monitoring Photo

#### Key Area HW-2

##### Rangeland Health Attribute 1: Soil and Site Stability

The ID Team did not observe any signs of erosion or unexpected soil movement/loss based on soils being intact, no compaction layer, and the lack of rills or gullies, water flow patterns, terracettes, pedestals and wind scouring; therefore, all of these indicators were rated as None to Slight. All litter size classes remained at the base of plants with little to no movement and was also rated None to Slight. The soil surface resistance to erosion was measured with an interspace average as 3, and an average of 3 under the canopy. The reference sheet gives a range of 3 to 4 in the interspaces and a range of 3 to 4 under the canopy; therefore, the soil surface resistance to erosion was rated None to Slight. The soil is naturally armored by gravel and all litter size classes were observed to be remaining at the base of plants with little to no movement expected. The presence of bare ground was measured at 36 percent, which is below the reference sheet range of 35 to 55 percent and was rated None to Slight.

Ten indicators for Soil and Site Stability were rated None to Slight. Therefore, the overall rating for the Soil and Site Stability attribute was rated None to Slight.

### **Rangeland Health Attribute 2: Hydrologic Function**

There were no rills or gullies observed, these indicators were rated None to Slight. Pedestals were uncommon and was rated None to Slight. Water flow patterns and terracettes were not observed and were rated None to Slight. Bare ground was measured at 36 percent, the reference sheet has a range of 35 to 55 percent, therefore it was rated None to Slight. Soil surface resistance to erosion was measured with an interspace average as 3 and 3 average under the canopy, within the averages of the reference sheet. Soil surface resistance to erosion was rated None to Slight, as the soil remains in place due to being naturally armored by gravel and all litter size classes remained at the base of plants with little to no movement. Soil surface loss or degradation was rated None to Slight as soil remained intact due to natural armoring. Canopy cover averaged 54 percent; however, the reference sheet did not give reference for canopy cover. Basal cover averaged 10 percent; however, the reference sheet did not give reference for basal cover. The reference sheet did give a typical composition which was 65 to 70 percent grasses, 20 to 25 percent shrubs and 5 to 10 percent forbs. Because the sites Plant Community Composition was similar to the reference sheet it was rate None to Slight. There was no compaction layer detected and it was rated None to Slight. Litter amount was measured at 14 percent which was within the reference sheet range and was rated None to Slight.

Ten indicators for Hydrologic Function were rated None to Slight. Therefore, the overall rating for the Hydrologic Function attribute was rated None to Slight.

### **Rangeland Health Attribute 3: Biotic Integrity**

Soil surface resistance to erosion was measured with an interspace average as 3 and an average of 3 under the canopy, which is above the averages of the reference sheet. Soil surface resistance to erosion was rated None to Slight, as the soil remains in place due to being naturally armored by gravel and all litter size classes remained at the base of plants with little to no movement. Soil surface loss or degradation was rated None to Slight as soils remained intact. Plant functional structure groups were rated None to Slight because the dominate species alkali sacaton and galleta were similar to the refence sheet. There was no compaction layer detected and it was rated None to Slight. Plant mortality and decadence was rated None to Slight because there was an even distribution of age classes amongst the vegetation. Litter amount was measured at 14 percent, which was within the reference sheet range and was rated None to Slight. Using ocular estimates, it was estimated at 125 pounds per acre for the annual production. The reference sheet describes a range of 70 to 278 pounds per therefore annual production was rated None to Slight. Invasive plants were not observed growing on site and it was rated None to Slight. Reproductive capability of perennial plants was rated None to Slight because the native plants are adapted to the climate and capable of reproducing except during the most severe droughts.

Nine indicators for Biotic Integrity were rated as None to Slight. Therefore, the overall rating for the Biotic Integrity attribute is None to Slight.

### **6.3.5 Clay loam wash 10-14" (R035XA104AZ) 17 Indicators for Key Area: HW-3**

For the 17 indicators of rangeland health, the ecological site reference sheet condition indicates:

1. **Number and extent of rills:** Very few expected due to the high plant cover potential of this site. Rills may occur due to finer textures, slow permeability, medium runoff, moderate to high shrink/swell (cracking) characteristic of many soils and rare to occasional flooding. The number and length of rills will be limited by the low slopes on the site.
2. **Presence of water flow patterns:** Water flow patterns (and occasional ponding) may be common due to the slow permeability of the soils. Water flow patterns should be short and shallow.
3. **Number and height of erosional pedestals or terracettes:** Few expected, Pedestals should be very short and along water flow patterns. Terracettes should also be very short and stop at obstructions.
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, and plant canopy are not bare ground):** Bare ground is expected to be less than 20-40 percent.
5. **Number of gullies and erosion associated with gullies:** Very few expected. Due to occasional flooding and extra run-on moisture a few gullies can form in areas where water flow is concentrated from adjacent uplands. There should be no active erosion and there will be vegetation stabilizing the gully.
6. **Extent of wind scoured, blowouts and/or depositional areas:** None expected.
7. **Amount of litter movement (described size and distance expected to travel):** None expected. During or after severe droughts, a few minor areas of deposition or hummock clay deposits may be present.
8. **Soil surface (top few mm) resistance to erosion (stability values are averages – most sites will show a range of values):** Soil surface textures range from sandy clay loam to clay but are mostly silty clay loam and sandy clay loam. The expected soil stability average ranges between 3-4. When well vegetated and not subjected to severe flood events, these soils have a low to moderate resistance to water erosion and a moderate resistance to wind erosion.
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is usually massive or granular (moderate, fine to medium). It may occasionally be platy (weak to moderate, medium to thick) or subangular blocky (weak, fine). Surface horizon thickness is generally 2 to 8 inches. Some soils may have been altered by past farming practices and have altered soil structure and thickness. Color is variable depending upon parent material.
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The site is characterized by a relatively even distribution of vegetation dominated by grasses with some shrubs. This plant community structure is highly effective at capturing and storing precipitation.
11. **Presence and thickness of compaction layer (usually non; describe soil profile features which may be mistaken for compaction on this site):** None. Due to the sites position on the landscape, it accumulates finer particles such silts and clays. The associated soil structure is platy or subangular blocky in the soil subsurface. These should not be considered to be compaction layers.
12. **Functional/Structural Groups:** (List in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to): Dominant: Warm season bunchgrasses >>; Sub-dominant: Warm

season colonizing grasses > Cool season colonizing grasses >; Other Large shrubs > Forbs > Cool season bunchgrasses = Half shrubs > Cacti

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All plant functional groups are adapted to survival in all but the most severe droughts. Severe winter droughts affect shrubs the most. Severe summer droughts affect grasses the most.
14. **Average percent litter cover and depth:** Litter cover is mostly fines with depths usually less than ½". Litter depths will be the greatest under canopies. Of the total litter amount, it would be expected that approximately 80-90 percent would be herbaceous litter and 10-20 percent would be woody litter. Litter amounts increase during the first few years of drought, then decrease in later years.
15. **Expected annual-production (this TOTAL above-ground annual-production, not just forage annual-production):** Average annual production on this site is expected to be 1600 to 2400 lbs/ac. in a year of average annual precipitation.
16. **Potential invasive (including noxious) species (native and non-native).** List species with BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Ring muhly, tumble grass, burrograss, broom snakeweed and rubber rabbitbrush are all native to the site, but they have the potential to increase and dominate the site after unmanaged grazing or surface disturbance. Russian thistle, filaree and cheatgrass are non-native annuals that can invade with or without disturbance.
17. **Perennial plant reproductive capability:** All plants native to this site are adapted and are capable of producing seeds, stolons and rhizomes in all but the most severe drought.

#### 6.3.5.1 HW-3 Clay Loam Wash (R035XA104AZ)

The following rangeland health assessments are for the Hardscrabble Wash Allotment, Key Area HW-3 within the Clay Loam Wash (R035XA104AZ) ecological site.





**Figure 15. Hardscrabble Wash Allotment Key Area Monitoring Photo HW-3**

### **Key Area HW-3**

#### **Rangeland Health Attribute 1: Soil and Site Stability**

The ID Team did not observe any signs of erosion or unexpected soil movement/loss based on soils being intact, no compaction layer, and the lack of rills or gullies, water flow patterns, terraces, pedestals and wind scouring; therefore, all of these indicators were rated as None to Slight. All litter size classes remained at the base of plants with little to no movement and was also rated None to Slight. The soil surface resistance to erosion was measured with an interspace average as 3, and an average of 4 under the canopy. The reference sheet gives a range of 3 to 4 in the interspaces and a range of 3 to 4 under the canopy; therefore, the soil surface resistance to erosion was rated None to Slight. The soil is naturally armored by gravel and all litter size classes were observed to be remaining at the base of plants with little to no movement expected. The presence of bare ground was measured at 32 percent, which is below the reference sheet range of 20 to 40 percent and was rated None to Slight.

Ten indicators for Soil and Site Stability were rated None to Slight. Therefore, the overall rating for the Soil and Site Stability attribute is None to Slight.

#### **Rangeland Health Attribute 2: Hydrologic Function**

There were no rills or gullies observed, these indicators were rated None to Slight. Pedestals were uncommon and the indicator was rated None to Slight. Water flow patterns and terracettes were not observed and were rated None to Slight. Bare ground was measured at 32 percent, the reference sheet has a range of 35 to 55 percent, therefore it was rated None to Slight. Soil surface resistance to erosion was measured with an interspace average as 3 and an average of 4 under the canopy, which is within the averages of the reference sheet. Soil surface resistance to erosion was rated None to Slight, as the soil remains in place due to being naturally armored by gravel and all litter size classes remained at the base of plants with little to no movement. Soil surface loss or degradation was rated None to Slight as soil remained intact due to natural armoring. Plant community composition average near the reference sheet averages as the site's basal cover values were within the average. Canopy cover averaged 60 percent, and the reference sheet does not give an average reference for canopy cover. Basal cover averaged 0 percent, and the reference sheet's average is 12 to 35 percent. Because the site plant community composition did not impact infiltration but did have low basal cover it was rated Slight to Moderate. There was no compaction layer detected and it was rated None to Slight. Litter amount was measured at 30 percent which was within the reference sheet range of 15 to 30 percent and was rated None to Slight.

Nine indicators for Hydrologic Function were rated None to Slight, and one indicator was rated Slight to Moderate. Therefore, the overall rating for the Hydrologic Function attribute was rated None to Slight.

### **Rangeland Health Attribute 3: Biotic Integrity**

Soil surface resistance to erosion was measured with an interspace average as 3 and an average of 4 under the canopy, which is above the averages of the reference sheet. Soil surface resistance to erosion was rated None to Slight, as the soil remains in place due to being naturally armored by gravel and all litter size classes remained at the base of plants with little to no movement. Soil surface loss or degradation was rated None to Slight as soils remained intact. Plant functional structure groups were rated None to Slight. There was no compaction layer detected and it was rated None to Slight. Plant mortality and decadence was rated None to Slight because there was an even distribution of age classes amongst the vegetation. Litter amount was measured at 30 percent which was within the reference sheet range of 15 to 35 percent and was rated None to Slight. Using ocular estimates, it was estimated at 1400 pounds per acre for the annual production. The reference sheet describes a range of 1200 to 2800 pounds per therefore annual production was rated None to Slight. Invasive plants observed growing only near a roadway, were Russian thistle, cocklebur and cheatgrass and it was rated Slight to Moderate. Reproductive capability of perennial plants was rated None to Slight because the native plants are adapted to the climate and capable of reproducing except during the most severe droughts.

Eight indicators for Biotic Integrity were rated as None to Slight and one indicator was rated Slight to Moderate. Therefore, the overall rating for the Biotic Integrity attribute is None to Slight.

## **7 Determinations of Land Health Standards**

### **7.1 Puerco Ridge Allotment**

The following determination of land health standards is for the Puerco Ridge Allotment.

#### ***Standard 1: Upland Sites***

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that appropriate to soil type, climate and landform.

Determination:

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

Rationale:

Overall, the soils throughout the Puerco Ridge Allotment are productive, stable, and in a sustainable condition. The key area monitoring data reflects the conditions described in the ESD reference sheets and are acceptable for meeting the Upland Sites standard. Although the data from the key areas shows that the grasses and shrubs composition was within the reference state there with an increase in the presence of forbs, juniper and cheatgrass. However, the vegetation is adequate in ensuring soil stabilization and appropriate permeability rates within the ecological site. Other indicators that the site is meeting the standard is that litter was remaining in place and the litter amount was within the range of the reference sheet. Bare ground was also measured at 16 percent, which is well below the reference sheet range of 35 to 45 percent and indicates a vegetated site. Little to no sign of erosion were observed at the site. There were no rills, gullies or terracettes and those indicators were rated None to Slight. Wind-scouring and litter movement were both rated None to Slight. Soil surface is naturally armored by rock and canopy cover.

#### ***Standard 2: Riparian-Wetland Sites***

Objective: Riparian-wetland areas are in proper functioning condition.

Determination:

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

**Rationale:**

There are no riparian-wetland sites located on the Puerco Ridge Allotment within the BLM-administered portions. The USFWS rendered BO on the Gila District Livestock Grazing Program #22410-2006-F-0414 (2012). Although Table 3 of the BO shows that the Puerco Ridge Allotment contained 77 acres of "not yet evaluated" riparian habitat, it also acknowledges in Table 1 that the Puerco Ridge Allotment contained no riparian habitat. It has been determined through ID Team site visits, review by the Safford Field Office Hydrologist, and an analysis in Section 2.2.5 of this LHE that there is no riparian habitat on BLM-administered portions of the allotment. Therefore, Standard 2 does not apply.

***Standard 3: Desired Resource Conditions on the Puerco Ridge Allotment***

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

Standard 3 is determined by evaluating whether DPC objectives are being supported and provided with consideration for all multiple uses: rangeland health, State water quality standards, and habitat for all wildlife species including Federally listed and BLM Sensitive species. Standards 1 and 2, when present, help to inform whether the desired plant communities are being supported or have the ability to function as desired.

**Determination:**

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

**Rationale:**

Based on the monitoring data and this land health evaluation, current livestock grazing is not preventing the Puerco Ridge Allotment from providing a productive and diverse upland native plant community that provides for all multiple uses. Due to the absence of riparian-wetland habitat there are no riparian-wetland plant communities considered in this evaluation of Standard 3.

The RHAs indicated that the Soil and Site Stability, Hydrologic Function, and Biotic Integrity attributes were within or were close to acceptable ranges to meet the criteria for Standard 1, as described in Sections 6.2 and 7.1.1. The allotment was also found to be providing adequate grass, shrub and forb composition and density to provide sufficient forage and shelter for wildlife species, as described in Section 2.3.3. Therefore, the ID Team determined that the Puerco Ridge Allotment is currently meeting Standard 3.

The following DPC objectives were established based on the ESD reference sheet to ensure current conditions on the allotment are maintained or improved. The DPC objectives provide a diverse plant community that will allow for natural ecological functions and provide habitat features, such as increased sources for shelter, cover and forage, for the present wildlife species as described above in Section 2.3.3. These DPC objectives will ensure rangeland health and State water quality standards are also being met.

**Sandy Loam Upland 10-14 p.z.”. (Key Area PR-1)**

Canopy cover – The DPC objective for canopy at this site is 37 to 67 percent and basal cover is 15 to 35 percent. The LPI monitoring measured the canopy cover at 52 percent and basal cover at 4 percent. The reference sheet for this site suggests that the canopy cover should be between 37 to 67 percent, and the basal cover should be between 15 to 35 percent (Indicator 10). Repeated drought conditions in recent years have prevented this site from increasing its productivity to provide greater canopy and basal cover, and it will remain a limiting factor for this site if drought conditions continue. The reference sheet states that both canopy and basal covers decrease during prolonged drought, which supports the ID Team’s observations. This reference sheet range remains a reasonable objective to manage for even with the limitations this site is experiencing.

Plant community composition - The reference sheet for this site characterizes the plant community composition (Indicator 10) as a range of 25 to 45 percent perennial grasses, 15 to 20 percent shrubs, 1 to 5 percent forbs and less than 2 percent trees. The total composition was measured with grasses at 37 percent, shrubs 14 percent, and trees were 0 percent. The rest of the vegetation was annual grasses and forbs. There was an increase of juniper in the surrounding area. The DPC objective for plant community composition at this site is a range of 25 to 45 percent for grass composition, 15 to 20 percent shrub composition, forb composition at 1 to 5 percent and tree composition at 1 to 5 percent. Lack of fire and drought conditions at the PR-1 site have contributed to the encroachment of juniper. Overall, this site is currently meeting the DPC objective.

Bare ground - The DPC objective for bare ground at this site is to maintain 35 to 45 percent bare ground. The LPI monitoring measured bare ground to be at 16 percent, which is below the reference sheet range of 35 to 45 percent of the total ground cover (Indicator 4). With bare ground meeting the DPC objective, this shows that the site is able to maintain the vegetation cover necessary to stabilize the soil in place.

Litter - The DPC objective for litter at this site is to maintain litter amounts at 25 to 40 percent. The LPI monitoring measured litter at 46 percent. The reference sheet indicates an acceptable litter average of 25 to 40 percent. Most herbaceous and fine woody litter will be transported by wind and in water flow pathways while a small percentage stays in place. Coarse woody litter and duff will accumulate under shrub and tree canopies.

This site is meeting the Standard for desired resource conditions even though it has endured repetitive years of drought, which is evident from the monitoring data collected at PR-1. The monitoring data depicts a lower amount of basal cover with bare ground meeting DPC objectives. With bare ground not increasing out of the desired range, this indicates that the site is

stable, and that the soil is able to withstand water and wind erosion due to the amount of cover, litter, and natural rock armoring present at the site.

Managing for these DPC objectives for the Sandy Loam Upland site will encourage a continued increase in the overall canopy and basal cover for grasses and shrubs, which will allow for more wildlife species such as antelope and small game to be supported through the increased availability of shelter and forage sources, as well as nesting opportunities. A greater amount of cover that is also diverse in its functional and structural group composition (i.e., grasses, shrubs, forbs, and trees) will be capable of supporting a greater variety of wildlife species. Continuing to provide an acceptable amount of bare ground is also important for the burrowing wildlife species, as discussed in Section 2.3.3.

### **7.1 Long H Ranch Allotment**

The following determination of land health standards is for the Long H Ranch Allotment.

#### ***Standard 1: Upland Sites***

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that appropriate to soil type, climate, and landform.

Determination:

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

Rationale:

Overall, the soils throughout the Long H Ranch Allotment are productive, stable, and in a sustainable condition. The key area monitoring data closely reflects the conditions described in the ESD. The data at the key areas shows that the canopy cover was slightly less however infiltration was not impacted because of the naturally armored soil. Litter was higher than the reference state, but the reference sheet states that litter amounts increase with drought conditions. Rock cover was adequate to ensure soil stabilization and appropriate permeability rates within the ecological sites. Little-to-no signs of erosion were observed at the site. There were no rills/gullies present and terracettes were rated None to Slight. Wind-scouring and litter movement were both rated None to Slight. Soil surface is naturally armored by rock cover.

#### ***Standard 2: Riparian-Wetland Sites***

Objective: Riparian-wetland areas are in proper functioning condition.

Determination:

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

**Rationale:**

There are no riparian-wetland sites located on the Long H Ranch Allotment within the BLM-administered portions. The Long H Ranch Allotment was created by dividing the Hardscrabble Wash Allotment after the USFWS rendered the BO on the Gila District Livestock Grazing Program #22410-2006-F-0414 (2012). In the BO, Long H Ranch Allotment is contained in the area described as Hardscrabble Wash Allotment. Looking at the Hardscrabble Wash Allotment in Table 1 of the BO, the BO acknowledges in that the Hardscrabble Wash Allotment contains no riparian habitat, and Table 3 does not show any acres of "not yet evaluated" riparian habitat. It has been determined through ID Team site visits, review by the Safford Field Office Hydrologist and an analysis in Section 2.2.5 of this LHE that there is no riparian habitat on BLM-administered portions of the allotment. Standard 2 does not apply.

***Standard 3: Desired Resource Conditions on the Long H Ranch Allotment.***

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

Standard 3 is determined by evaluating whether DPC objectives are being supported and provided with consideration for all multiple uses: rangeland health, State water quality standards, and habitat for all wildlife species including Federally listed and BLM Sensitive species. Standards 1 and 2, when present, help to inform whether the desired plant communities are being supported or have the ability to function as desired.

**Determination:**

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

**Rationale:**

Based on the monitoring data and this LHE, current livestock grazing is not preventing the Long H Ranch Allotment from providing a productive and diverse upland native plant community that

provides for all multiple uses. Due to the absence of riparian-wetland habitat there are no riparian-wetland plant communities considered in this evaluation of Standard 3.

The RHAs indicated that the Soil and Site Stability attributes were within or were close to acceptable ranges to meet the criteria for Standard 1, as described in Sections 6.2 and 7.2.1 under the Hydrologic Function and Biotic Integrity attributes. The allotment was also found to be providing adequate grass, shrub and forb composition and density to provide sufficient forage and shelter for wildlife species, as described in Section 2.3.3. Therefore, the ID Team determined that the Long H Ranch Allotment is currently meeting Standard 3.

The following DPC objectives were established based on the ESD reference sheet to ensure current conditions on the allotment are maintained or improved. The DPC objectives provide a diverse plant community that will allow for natural ecological functions and provide habitat features, such as increased sources for shelter, cover and foraging, for the wildlife species described above in Section 2.3.3. These DPC objectives will ensure rangeland health and State water quality standards are also being met.

#### **Sandy Upland 10-14 p.z. (Key Area LH-1)**

Canopy cover - The DPC objective for canopy cover at this site is 35 to 45 percent and basal cover is 1 to 12 percent. In Table 6 of the ESD, a desired range of canopy cover was not given, but it did include a desired basal cover range of 1 to 12 percent for grasses, 1 to 7 percent for shrubs, 1 to 4 percent for forbs and 0 to 2 percent trees. The DPC objective was established based on the measured LPI data and the observations of the ID Team. The LPI measured canopy cover at 70 percent and 8 percent basal cover. The total percent litter cover measuring 52 percent, which is above the 20 to 35 percent range given in the ESD. This data indicates that the canopy cover is higher than the objective, while basal cover is within the desired range.

Plant community composition - The reference sheet for this site characterizes the plant community composition (Indicator 12) as a range of 35 to 45 percent for cool season grasses and 30 to 40 for warm season grasses, 15 to 25 percent shrubs, 5 to 10 percent forbs and 1 to 5 percent trees. The total composition measured was grasses at 34 percent, shrubs at 15 percent, annual forbs at 2 percent and trees were 49 percent. Repeated drought conditions have hindered the sites production and may continue to prevent the site from experiencing a large increase in cover for these plant communities if drought conditions persist. Due to this limiting factor, the DPC objective for plant community composition at this site is to maintain the grass composition range at 30 to 45 percent, the shrub composition at 15 to 25 percent, and the forb composition at 5 to 10 percent. Tree composition is expected to be 1 to 5 percent at this site. Lack of fire and drought conditions at the LH-1 site have contributed to the encroachment of juniper, while drought has also contributed to the decrease of the percent of vegetative cover.

Bare ground - The reference sheet (Indicator 4) for this site indicates that bare ground has an acceptable range of 35 to 55 percent. The LPI monitoring measured bare ground to be at 34 percent, slightly lower than the ESD; therefore, the DPC objective at this site is to maintain 35 to 55 percent bare ground. The ESD does note that drought conditions may cause an increase in bare ground.



Litter - The reference sheet (Indicator 14) gives an acceptable litter cover range of 20 to 35 percent and characterizes litter cover as a range of 25 to 60 percent cover under shrub and tree canopies with a depth of one-eighth to one-quarter inch thick, while the interspaces between plants have a range of 10 to 20 percent. The LPI monitoring measured litter at 52 percent, which falls above the acceptable litter cover range given by the reference sheet. The DPC objective will remain at 20 to 35 percent range for litter cover.

Overall, by increasing the amount of grass, shrub, and forb cover and composition and decreasing the amount of trees (i.e., juniper), the site will continue to support a broad range of mammals, migratory and songbirds, and ungulate species such as antelope. The juniper tree cover does provide food for pinyon jays and shelter habitat for elk but decreasing the tree cover percent would allow for a more diverse group of wildlife species to be supported at this site. At this point in time, the site has transitioned to the Juniper State on the STM (Section 4.2.2), and the site will naturally remain in this state due to the absence of a natural fire regime.

#### **Sandy Loam Upland 10-14 p.z.”. (Key Area LH-2)**

Canopy cover - The DPC objective for canopy at this site is 37 to 67 percent and basal cover is 15 to 35 percent. The LPI monitoring measured the canopy cover at 24 percent and basal cover at 6 percent. The reference sheet for this site suggests that the canopy cover should be between 37 to 67 percent, and the basal cover should be between 15 to 35 percent (Indicator 10). Repeated drought conditions in recent years have prevented this site from increasing its productivity to provide greater canopy and basal cover, and it will remain a limiting factor for this site if drought conditions continue. The reference sheet states that both canopy and basal covers decrease during prolonged drought, which supports the ID Team’s observations. This reference sheet range remains a reasonable objective to manage for even with the limitations this site is experiencing. The ESD does not provide a suggested range for plant composition but indicates that warm season grasses should be the dominant species for this site, followed by scattered by shrubs with forbs and trees present in trace amounts. By managing this site to meet the canopy and basal cover objectives for grasses the expected composition of a grass-dominant site will also be achieved.

Plant community composition - The ESD for this site characterizes the plant community composition (Indicator 10) as a range of 20 to 40 percent perennial grasses, 15 to 20 percent shrubs, 1 to 5 percent forbs and less than 2 percent trees. The total measured composition was grasses at 21 percent, shrubs at 36 percent, and trees at 43 percent. The DPC objective for plant community composition at this site is for grass composition to a range of 25 to 45 percent, the shrub composition to 15 to 20 percent, and the forb composition to 1 to 5 percent. Tree composition is expected to be 1 to 5 percent at this site. The site is not meeting the DPC objective with the increase juniper and shrubs on site. Continued lack of fire and drought conditions at the LH-2 site have contributed to the encroachment of juniper.

Bare ground - The DPC objective for bare ground at this site is to maintain 35 to 45 percent bare ground. The LPI monitoring measured bare ground to be at 16 percent, which is below the ESD range of 35 to 45 percent of the total ground cover (Indicator 4). With bare ground meeting the

DPC objective, this shows that the site is able to maintain the vegetative cover necessary to stabilize the soil in place.

Litter - The DPC objective for litter at this site is to maintain litter amounts at 25 to 40 percent, which is the acceptable average range according to the ESD reference sheet. Most herbaceous and fine woody litter will be transported by wind and in water flow pathways, while a small percentage stays in place. Coarse woody litter and duff will accumulate under shrub and tree canopies. The LPI monitoring measured litter at 34 percent. This DPC litter cover range is a reasonable objective to manage for, while factoring in the site's limitations of increasing the plant cover due to having experienced repeated drought conditions in past years.

This site is meeting the standard for desired resource conditions except for the plant composition objective. It has endured repetitive years of drought, which is evident from the monitoring data collected at LH-2. The site has transitioned to a Juniper State. The monitoring data depicts a lower amount of basal cover; however, the bare ground is meeting DPC objectives. With bare ground not increasing out of the desired range, this indicates that the site is stable, that the soil is able to withstand water and wind erosion due to the amount of vegetative and rock cover present at the site. Managing for these DPC objectives for the Sandy Loam Upland site will encourage a continued increase in the overall canopy and basal cover for grasses and shrubs, which will allow for more wildlife species such as antelope and small game to be supported through the increased availability of shelter and forage sources, as well as nesting opportunities. A greater amount of cover that is also diverse in its functional and structural group composition (i.e., grasses, shrubs, forbs, and trees) will be capable of supporting a greater variety of wildlife species. Continuing to provide an acceptable amount of bare ground is also important for the burrowing wildlife species, as discussed in Section 2.3.3.

## **7.1 Hardscrabble Wash Allotment**

### ***Standard 1: Upland Sites***

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

Determination:

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

Rationale:

Overall, the soils throughout the Hardscrabble Wash Allotment are productive, stable, and in a sustainable condition. The key area monitoring data aligns with the conditions described within the ESD's reference sheets and are acceptable for meeting the Upland Sites standard. Although

the data from the key areas shows that canopy cover, basal cover, litter, and plant composition cover in some areas are below the expected range according to the ESDs, they are adequate in ensuring soil stabilization and appropriate permeability rates within the ecological sites. This reduced amount of canopy cover, basal cover, litter, and plant community composition can be attributed to the repeated drought conditions experienced in past years.

Little to no signs of erosion was observed at any of the sites. There were no rills present and it was rated None to Slight. Pedestals and/or terracettes were rated None to Slight and were not observed. Wind-scouring and litter movement were both rated None to Slight. Soil surfaces are naturally armored by canopy cover, litter and rocks.

***Standard 2: Riparian-Wetland Sites***

Objective: Riparian-wetland areas are in proper functioning condition.

Determination:

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

Rationale:

There are no riparian-wetland sites located on the Hardscrabble Wash Allotment within the BLM-administered portions. The Hardscrabble Wash Allotment used to contain what is now the Long H Allotment prior to the USFWS rendered the BO on the Gila District Livestock Grazing Program #22410-2006-F-0414 (2012). In the BO, the Hardscrabble Wash Allotment in Table 1 acknowledges that the allotment contains no riparian habitat, and Table 3 does not show any acres of “not yet evaluated” riparian habitat. It has been determined through ID Team site visits, review by the Safford Field Office Hydrologist and an analysis in Section 2.2.5 of this LHE that there is no riparian habitat on BLM-administered portions of the allotment. Standard 2 does not apply.

***Standard 3: Desired Resource Conditions***

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

Standard 3 is determined by evaluating whether DPC objectives are being supported and provided with consideration for all multiple uses: rangeland health, State water quality standards, and habitat for all wildlife species including Federally listed and BLM Sensitive species. Standards 1 and 2, when present, help to inform whether the desired plant communities are being supported or have the ability to function as desired.

Determination:

- Meeting the Standard
- Not Meeting the Standard; Making Significant Progress Toward Standard
- Not Meeting the Standard; Not Making Significant Progress Toward Standard
- Standard Does Not Apply

Rationale:

Based on the monitoring data and this LHE, current livestock grazing is not preventing the Hardscrabble Wash Allotment from providing a productive and diverse upland native plant community that provides for all multiple uses. Due to the absence of riparian-wetland habitat there are no riparian-wetland plant communities considered in this evaluation of Standard 3.

The RHAs indicated that the Soil and Site Stability, Hydrologic Function, and Biotic Integrity attributes were within or were close to acceptable ranges to meet the criteria for Standard 1, as described in Sections 6.2 and 7.3.1. The allotment was also found to be providing adequate grass, shrub and forb composition and density to provide sufficient forage and shelter for wildlife species, as described in Section 2.3.3. Therefore, the ID Team determined that the Hardscrabble Wash Allotment is currently meeting Standard 3.

The following DPC objectives were established based on the ESD reference sheet to ensure current conditions on the allotment are maintained or improved. The DPC objectives provide a diverse plant community that will allow for natural ecological functions and provide habitat features, such as increased sources for shelter, cover and foraging, for the wildlife species described above in Section 2.3.3. These DPC objectives will ensure rangeland health State water quality standards are also being met.

**Sandy Loam Upland 10-14 p.z.”. (Key Area HW-1)**

Canopy cover - The DPC objective for canopy at this site is 37 to 67 percent and basal cover is 15 to 35 percent. The LPI monitoring measured the canopy cover at 44 percent and basal cover at 12 percent. The ESD for this site suggests that the canopy cover should be between 37 to 67 percent, and the basal cover should be between 15 to 35 percent (Indicator 10). Repeated drought conditions in recent years have prevented this site from increasing its productivity to provide greater canopy and basal cover, and it will remain a limiting factor for this site if drought conditions continue. The ESD states that both canopy and basal covers decrease during prolonged drought, which supports the ID Team’s observations. This ESD range remains a reasonable objective to manage for even with the limitations this site is experiencing. By managing this site to meet the canopy and basal cover objectives for grasses the expected composition of a grass-dominant site will also be achieved.

Plant community composition - The ESD for this site characterizes the plant community composition (Indicator 12) as a range of 25 to 45 percent perennial grasses, 15 to 20 percent shrubs, 1 to 5 percent forbs and less than 2 percent trees. The total composition was grasses at 75

percent, shrubs at 17 percent, and trees at 0 percent. The rest of the vegetation was annual grasses and forbs. There was an increase in juniper in the surrounding area. The DPC objective for plant community composition at this site is to for grass composition to be at a range of 25 to 45 percent, the shrub composition at 15 to 20 percent, and the forb composition at 1 to 5 percent. Tree composition is expected to be 1 to 5 percent at this site. Lack of fire and drought conditions at the HW-1 site have contributed to the encroachment of one-seed juniper. The site is meeting the DPC objective.

Bare ground - The DPC objective for bare ground at this site is to maintain 35 to 45 percent bare ground. The LPI monitoring measured bare ground to be at 30 percent which is below the ESD range of 35 to 45 percent of the total ground cover (Indicator 4). With bare ground meeting the DPC objective, this shows that the site is able to maintain the vegetation cover necessary to stabilize the soil in place.

Litter - The DPC objective for litter at this site is to maintain litter amounts at 25 to 40 percent. The ESD indicates an acceptable litter average of 25 to 40 percent. Most herbaceous and fine litter will be transported by wind and in water flow pathways, while a small percentage stays in place. Coarse woody litter and duff will accumulate under shrub and tree canopies. The LPI monitoring measured litter at 30 percent. This DPC litter cover range is a reasonable objective to manage for, while factoring in the site's limitations of increasing the plant cover due to having experienced repeated drought conditions in past years.

This site is meeting the standard for desired resource conditions even though it has endured repetitive years of drought, which is evident from the monitoring data collected at HW-1. The monitoring data depicts a lower amount of basal cover with bare ground meeting DPC objectives. With bare ground not increasing out of the desired range, this indicates that the site is stable and is able to withstand water and wind erosion due to the amount of cover present at the site.

Managing for these DPC objectives for the Sandy Loam Upland site will encourage a continued increase in the overall canopy and basal cover for grasses and shrubs, which will allow for more wildlife species such as antelope and small game to be supported through the increased availability of shelter and forage sources, as well as nesting opportunities. A greater amount of cover that is also diverse in its functional and structural group composition (i.e., grasses, shrubs, forbs, and trees) will be capable of supporting a greater variety of wildlife species. Continuing to provide an acceptable amount of bare ground is also important for the burrowing wildlife species, as discussed in Section 2.3.3.

#### **Shale Upland 6-10" p.z. (Key Area HW-2)**

Canopy cover - The LPI monitoring measured the canopy cover at 54 percent and basal cover at 10 percent. The DPC objective for canopy cover is 40 to 60 percent and for basal cover 5 to 15 percent. The ESD reference sheet did not provide a suggested range for canopy cover and for basal cover. The new DPC objectives were established based on the measured LPI data and the observations of the ID team. Repeated drought conditions in recent years have prevented this site from increasing its productivity to provide greater canopy and basal cover, and it will remain a

limiting factor for this site if drought conditions continue. The ESD states that both canopy and basal covers decrease during prolonged drought, which supports the ID Team's observations. This ESD range remains a reasonable objective to manage for even with the limitations this site is experiencing. The ESD does not provide a suggested range for plant composition but indicates that alkali sacaton and galleta should be the dominant species for this site, followed by scattered forbs and shrubs with non-native annuals present in trace amounts. By managing this site to meet the canopy and basal cover objectives for grasses the expected composition of a grass-dominant site will also be achieved.

Plant community composition - The ESD for this site characterizes the plant community composition as a range of 65 to 70 percent perennial grasses, 20 to 25 percent shrubs, 5 to 10 percent forbs and 0 percent trees. The total composition was grasses at 97 percent, forbs were at 3 percent, shrubs 0 percent, and trees were 0 percent. There were shrubs in the surrounding area. The DPC objective for plant community composition at this site is to for grass composition to a range of 60 to 70 percent, the shrub composition to 20 to 25 percent, and the forb composition to 5 to 10 percent. With shrubs near the LPI the site is meeting the DPC objective.

Bare ground - The DPC objective for bare ground at this site is to maintain 25 to 50 percent bare ground. The LPI monitoring measured bare ground to be at 36 percent, which is within the ESD range of 25 to 50 percent of the total ground cover (Indicator 4). With bare ground meeting the DPC objective, this would show that the site is able to maintain the vegetation cover necessary to stabilize the soil in place.

Litter - The DPC objective for litter at this site is 0 percent, and the ESD indicates an acceptable litter average of 0 percent. The LPI monitoring measured litter at 14 percent; therefore, this DPC objective is being met.

This site is meeting the standard for desired resource conditions. The monitoring data depicts the amount of canopy cover with bare ground are meeting DPC objectives. With bare ground not increasing out of the desired range, this indicates that the site is stable, and that the soil is able to withstand water and wind erosion due to the amount of cover present at the site.

Managing for these DPC objectives for the Clayey Fan site will encourage a continued increase in the overall canopy and basal cover for grasses and shrubs, which will allow for more wildlife species such as antelope and small game to be supported through the increased availability of shelter and forage sources, as well as nesting opportunities. A greater amount of cover that is also diverse in its functional and structural group composition (i.e., grasses, shrubs, forbs, and trees) will be capable of supporting a greater variety of wildlife species. Continuing to provide an acceptable amount of bare ground is also important for the burrowing wildlife species, as discussed in Section 2.3.3.

#### **Clay Loam Wash 10-14 p.z. (Key Area HW-3)**

Canopy cover - The new DPC objective for canopy cover at this site is 35 to 45 percent and basal cover is 1 to 10 percent. The ESD reference sheet did not provide a suggested range for canopy cover, but it does indicate a desired range of basal cover for grasses (10 to 25 percent), shrubs (1

to 5 percent), and forbs (1 to 5 percent) (USDA NRCS 2012a, p.6 Table 7). The new DPC objectives were established based on the measured LPI data and the observations of the ID Team. The ID Team noted a dominance of alkali sacaton, which has the ability to grow and reproduce during the summer months when most of the area's precipitation is received. This site is bottom land that collects precipitation runoff from the surrounding area and is capable of producing 1,200 to 2,400 pounds per acre of annual production in a normal year of precipitation (Indicator 15). The ID Team estimated the annual production to be 1,400 pounds per acre, which is within the acceptable range. Effects of past drought conditions are apparent at this site. Canopy cover was measured to be 60 percent and basal cover was 0 percent. Canopy cover was above the DPC objective and basal cover was lower than the objective.

Plant community composition - The ESD for this site characterizes the plant community composition as a range of 70 to 80 percent grasses, 5 to 10 percent shrubs, and 10 to 20 percent forbs. The measured percent grass from LPI monitoring was 81 percent, shrubs were 0 percent, and annual forbs were at 19 percent. Shrubs were not detected during the LPI monitoring but were observed at the site by the ID Team. The DPC objective for this site is a plant community range of 70 to 80 percent grasses, 5 to 10 percent shrubs, and 10 to 20 percent forbs. The site is meeting DPC objectives.

Bare ground - The DPC objective for bare ground is a range of 20 to 40, which is within the range provided by the ESD as an acceptable bare ground range (Indicator 4). The LPI monitoring found that bare ground was at 32 percent, which is within the expected range. The RHA indicators, evaluated by the ID Team, associated with soil and site stability did not indicate that the site was experiencing erosion from wind or water greater than what is expected for the site; therefore, with bare ground being within the expected range it does not appear to be prohibiting the site from functioning.

Litter - The DPC objective for litter at this site is to maintain litter amounts at 15 to 35 percent. This is the acceptable litter range provided by ESD reference sheet (USDA NRCS 2012a, p.6, Table 6). The LPI data totaled the measured litter cover at 44 percent, which is above the acceptable range. The ESD also states that of the 15 to 35 percent litter range, it would be expected that approximately 80 to 90 percent would be herbaceous litter and 10 to 20 percent would be woody litter (Indicator 14). Litter amounts increase during the first few years of drought, then decrease in later years. The DPC objective is being met.

Managing for these DPC objectives for the Clay Loam Wash site will encourage a continued increase in the overall canopy and basal cover for grasses and shrubs, which will allow for more wildlife species such as antelope and small game to be supported through the increased availability of shelter and forage sources, as well as nesting opportunities. A greater amount of cover that is also diverse in its functional and structural group composition (i.e., grasses, shrubs, forbs, and trees) will be capable of supporting a greater variety of wildlife species. Continuing to provide an acceptable amount of bare ground is also important for the burrowing wildlife species, as discussed in Section 2.3.3.

## 8 Recommended Management Actions

### 8.1 Terms and Conditions for the Puerco Ridge Allotment

Based on the determinations in Section 7 Determinations of Land Health Standards, the following management actions are recommended:

1. Grazing management on the Puerco Ridge Allotment will continue in accordance with the terms and conditions of the term lease, as follows:

Allotment	Number and Kind of Livestock	Season of Use	Percent Public Lands	AUMs
Puerco Ridge (No. 06176)	23 Cattle	March 1 – February 28	100	276

2. Continue with these Other Terms and Conditions:
  - In order to improve livestock distribution on the public lands, all salt blocks and/or mineral supplements shall not be placed within a ¼ mile of any riparian area, wet meadow or watering facility (either permanent or temporary) unless stipulated through a written agreement or decision in accordance with 43 CFR 4130.3-2(C).
3. The following Other Terms and Conditions should be deleted as it is a duplicate of the Standard Terms and Conditions associated with this BLM lease:
  - If in connection with allotment operations under this authorization, any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3048; U.S.C. 3001) are discovered, the Permittee shall stop operations in the immediate area of the discovery, protect the remains and objects, and immediately notify the Authorized Officer of the discovery. The Permittee shall continue to protect the immediate area of the discovery until notified by the Authorized Officer that operations may resume.
4. The following Other Terms and Conditions should be added to the BLM lease:
  - The lessee shall submit, upon request, a report of the actual grazing use made on this allotment for the previous grazing period, March 1 to February 28. Failure to submit such a report by March 15 of the current year may result in suspension or cancellation of the grazing lease.
  - The lessee shall provide reasonable administrative access across private and leased lands to the BLM for the orderly management and protection of the public lands.

### 8.1 Terms and Conditions for the Long H Ranch Allotment

1. Grazing management on the Long H Ranch Allotment will continue in accordance with the terms and conditions of the term lease, as follows:



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Allotment	Number and Kind of Livestock	Season of Use	Percent Public Lands	AUMs
Long H Ranch (No. 01781)	62 Cattle	March 1 – February 28	100	744

2. The following Other Terms and Conditions should be added to the BLM lease:
  - The lessee shall submit, upon request, a report of the actual grazing use made on this allotment for the previous grazing period, March 1 to February 28. Failure to submit such a report by March 15 of the current year may result in suspension or cancellation of the grazing lease.
  - In order to improve livestock distribution on the public lands, all salt blocks and/or mineral supplements shall not be placed within a ¼ mile of any riparian area, wet meadow or watering facility (either permanent or temporary) unless stipulated through a written agreement or decision in accordance with 43 CFR 4130.3-2(C).
  - The lessee shall provide reasonable administrative access across private and leased lands to the BLM for the orderly management and protection of the public lands.

**8.1 Terms and Conditions for the Hardscrabble Wash Allotment**

1. Grazing management on the Hardscrabble Wash Allotment will continue in accordance with the terms and conditions of the term lease, as follows:

Allotment	Number and Kind of Livestock	Season of Use	Percent Public Lands	AUMs
Hardscrabble Wash (No. 06110)	62 Cattle	March 1 – February 28	100	744

2. Continue with these Other Terms and Conditions:
  - In order to improve livestock distribution on the public lands, all salt blocks and/or mineral supplements shall not be placed within a ¼ mile of any riparian area, wet meadow or watering facility (either permanent or temporary) unless stipulated through a written agreement or decision in accordance with 43 CFR 4130.3-2(C).
3. The following Other Terms and Conditions should be deleted as it is a duplicate of the Standard Terms and Conditions associated with this BLM lease:
  - If in connection with allotment operations under this authorization, any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3048; U.S.C. 3001) are discovered, the Permittee shall stop operations in the immediate area of the discovery, protect the remains and objects, and immediately notify the Authorized Officer of the discovery. The Permittee shall continue to protect the immediate area of the discovery until notified by the Authorized Officer that operations may resume.
  - Grazing fee payment are due on the date specified on the billing notice, and must be paid in full within 15 days of the due date, except as otherwise provided in the grazing permit

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or lease. If payment is not made within that time frame, a late fee (greater of \$25 or 10 percent of the amount owed but not more than \$250) will be assessed.

4. The following Other Terms and Conditions should be added to the BLM lease:
  - The lessee shall submit, upon request, a report of the actual grazing use made on this allotment for the previous grazing period, March 1 to February 28. Failure to submit such a report by March 15 of the current year may result in suspension or cancellation of the grazing lease.
  - The lessee shall provide reasonable administrative access across private and leased lands to the BLM for the orderly management and protection of the public lands.

## **9 List of Preparers**

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## **10 Consultation**

Arizona Game and Fish Department

Ernest Grimlan, Long H Ranch Allotment Permittee

Lance and Kristen Knight, Puerco Ridge Allotment and Hardscrabble Wash Allotment Permittee

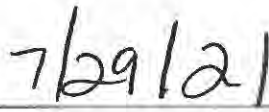
U.S. Fish and Wildlife Service

## 11 Authorized Officer Concurrence

I have reviewed the determinations presented in *Section 7.0 Determinations of Land Health Standards* and the grazing and other management actions identified in *Section 8.0 Recommended Management Actions*.

- I concur with the conclusions and recommendations as written.
- I do not concur.
- I concur, but with the following modifications.

  
\_\_\_\_\_  
Scott C. Cooke  
Field Office Manager

  
\_\_\_\_\_  
Date

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### 13 Appendix A: Monitoring Data

KEY AREA INFORMATION	SPECIES	LINE POINT INTERCEPT COVER AT PR-1		
		CANOPY	COMPOSITION	BASAL
<b>Puerco Ridge Allotment</b>	Blue Grama ( <i>Bouteloua gracilis</i> )	12%	19%	2%
Ecological Site ID: Sandy Loam Upland 10-14" (R035XA117AZ)	Sand Sagebrush ( <i>Artemisia filifolia</i> )	2%	2%	2%
	Tobosa ( <i>Pleuraphis mutica</i> )	6%	6%	0%
	Unknown Annual Forb	22%	24%	0%
	Unknown Perennial Forb	4%	4%	0%
	Threawn ( <i>Aristida</i> )	0%	6%	0%
	<b>COVER/LITTER/BARE GROUND</b>	Broom Snake Weed ( <i>Gutierrezia sarothrae</i> )	10%	10%
	Unknown Perennial Grass 1	2%	4%	0%
	Unknown Perennial Grass 2	2%	2%	0%
	Unknown Shrub	2%	2%	0%
	Unknown Annual Grass	6%	21%	0%
<b>BARE GROUND</b>		10%		
<b>BASAL COVER</b>		4%		
<b>CANOPY COVER</b>		68%		
<b>LITTER</b>		46%		

KEY AREA INFORMATION	SPECIES	LINE POINT INTERCEPT COVER AT LH-1		
		CANOPY	COMPOSITION	BASAL
<b>Long H Allotment</b>	Blue Grama ( <i>Bouteloua gracilis</i> )	4%	5%	2%



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Ecological Site ID: Sandy Upland 10-14" (R035XA118AZ)	Indian ricegrass ( <i>Achnatherum hymenoides</i> )	2%	2%	0%
	Needle and thread ( <i>Hesperostipa comata ssp. comata</i> )	14%	23%	6%
	Broom Snake Weed ( <i>Gutierrezia sarothrae</i> )	4%	5%	0%
	Galleta ( <i>Pleuraphis jamesii</i> )	0%	2%	0%
	Juniper ( <i>Juniperus spp.</i> )	42%	49%	0%
<b>COVER/LITTER/BARE GROUND</b>	Mormon Tea ( <i>Ephedra spp.</i> )	0%	5%	0%
	Unknown Shrub	4%	5%	0%
	Unknown Perennial Grass	0%	2%	0%
	Unknown Annual Forb	0%	2%	0%
<b>BARE GROUND</b>	22%			
<b>BASAL COVER</b>	8%			
<b>CANOPY COVER</b>	70%			
<b>LITTER</b>	52%			

KEY AREA INFORMATION	SPECIES	LINE POINT INTERCEPT COVER AT LH-2		
		CANOPY	COMPOSITION	BASAL
<b>Long H Allotment</b>	Blue Grama ( <i>Bouteloua gracilis</i> )	2%	14%	2%
Ecological Site ID: Sandy Loam Upland 10-14" (R035XA117AZ)	Sand Sagebrush ( <i>Artemisia filifolia</i> )	2%	14%	0%
	Needle and thread ( <i>Hesperostipa comata ssp. comata</i> )	2%	7%	2%

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	Broom Snake Weed ( <i>Gutierrezia sarothrae</i> )	6%	22%	2%
	Juniper ( <i>Juniperus spp.</i> )	12%	43%	0%
<b>COVER/LITTER/BARE GROUND</b>				
<b>BARE GROUND</b>	46%			
<b>BASAL COVER</b>	8%			
<b>CANOPY COVER</b>	24%			
<b>LITTER</b>	34%			

KEY AREA INFORMATION	SPECIES	LINE POINT INTERCEPT COVER AT HW-1		
		CANOPY	COMPOSITION	BASAL
<b>Hardscrabble Wash Allotment</b>	Blue Grama ( <i>Bouteloua gracilis</i> )	30%	67%	12%
Ecological Site ID: Sandy Loam Upland 10-14" (R035XA117AZ)	Needle and thread ( <i>Hesperostipa comata ssp. comata</i> )	4%	8%	0%
	Rabbit bush ( <i>Ericameria nauseosa ssp. nauseosa var. bigelovii</i> )	6%	13%	0%
	Snake Weed ( <i>Gutierrezia sarothrae</i> )	2%	4%	0%
	Annul forb	0%	4%	0%
	Annual Grass	2%	4%	0%
<b>COVER/LITTER/BARE GROUND</b>				
<b>BARE GROUND</b>	30%			
<b>BASAL COVER</b>	12%			
<b>CANOPY COVER</b>	44%			
<b>LITTER</b>	30%			

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KEY AREA INFORMATION	SPECIES	LINE POINT INTERCEPT COVER AT HW-2		
		CANOPY	COMPOSITION	BASAL
<b>Hardscrabble Wash Allotment</b>	Alkali Sacaton ( <i>Sporobolus airoides</i> )	10%	18%	4%
Ecological Site ID: Shale Upland 6-10" (R035XB220AZ)	Galleta ( <i>Pleuraphis jamesii</i> )	42%	75%	6%
	Unknown Forb	2%	3%	0%
	Unknown Perennial Grass	0%	4%	0%
<b>COVER/LITTER/BARE GROUND</b>				
<b>BARE GROUND</b>		36%		
<b>BASAL COVER</b>		10%		
<b>CANOPY COVER</b>		54%		
<b>LITTER</b>		14%		

KEY AREA INFORMATION	SPECIES	LINE POINT INTERCEPT COVER AT HW-3		
		CANOPY	COMPOSITION	BASAL
<b>Hardscrabble Wash Allotment</b>	Alkali Sacaton ( <i>Sporobolus airoides</i> )	32%	56%	0%
Ecological Site ID: Clay loam wash 10-14" (R035XA104AZ)	Annual Forb	12%	19%	0%
	Galleta ( <i>Pleuraphis jamesii</i> )	16%	25%	0%
<b>COVER/LITTER/BARE GROUND</b>				
<b>BARE GROUND</b>		32%		
<b>BASAL COVER</b>		0%		
<b>CANOPY COVER</b>		60%		
<b>LITTER</b>		30%		

## 14 Appendix B: Wildlife

Federally Listed Species			
Species	Federal Status	Critical Habitat	Comments
Black-footed ferret ( <i>Mustela nigripes</i> )	Endangered, non-essential experimental population	No Designation	Based on the ESDs of this allotment and the results of monitoring data, BLM-administered portions of the allotments contain suitable habitat to support this species if it was present. Due to the lack of their primary prey species and source for burrows, this species is expected to be absent from the allotments.
Yellow-billed cuckoo -distinct population segment ( <i>Coccyzus americanus</i> )	Threatened	Proposed	Yellow-billed cuckoos primarily occur in cottonwood-willow gallery forests of riparian zones of Arizona. The allotments do not have habitat considered suitable for this species, however cuckoos may utilize upland areas of the allotment, comprised of pinyon-juniper, for 2-3 weeks prior to migration to and from suitable breeding habitat (Hughes, 2015). Due to the short duration of potential occurrence and the lack of nearby habitat, we expect no effect to the species.
Mexican wolf ( <i>Canis lupus baileyi</i> )	Endangered, non-essential experimental population	No Designation	Wolves have been documented within 5 miles of the action area. The Long H Ranch Allotment and Hardscrabble Allotment contain sections of the species' migration corridor between USFS and Tribal lands. Individual wolves that disperse from the experimental population into the action area, could be disturbed by humans working near individuals, but they would likely move to other areas. Livestock grazing would be managed to improve or maintain the productivity of the area and would not affect the native prey base of the wolf.

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Monarch butterfly ( <i>Danaus plexippus</i> )	Candidate	No Designation	Adult monarchs require a diversity of blooming nectar sources along breeding and migration corridors. Monarchs and milkweed are not known to occur on the allotments. It is possible butterflies could move through the area and utilize junipers as stopover roosts, but habitat is not suitable to support the species for breeding.
Northern Mexican gartersnake ( <i>Thamnophis eques megalops</i> )	Threatened	Proposed	The northern Mexican gartersnake is a riparian obligate species; there is no suitable habitat on the three allotments.
Zuni bluehead sucker ( <i>Catostomus discobolus yarrow</i> )	Endangered	Designated	No perennial water or suitable aquatic habitat exist on the three allotments.

Source: USFWS Report, retrieved April 23, 2021 (USDI USFWS N.d.)

BLM Sensitive Species	
Species	Comments
<b>Amphibians</b>	
There are no BLM sensitive amphibians known to occur in the BLM-administered portions of the Puerco Ridge, Hardscrabble Wash and Long H Ranch Allotments.	
<b>Birds</b>	
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Wintering bald eagles occur along the Little Colorado river and may use the allotments as foraging habitat. Typically nest in forested areas adjacent to large bodies of water. They prefer to perch on tall, mature coniferous or deciduous trees that provide a wide view of their surroundings. There are no known impacts of livestock on bald eagles.
Ferruginous hawk ( <i>Buteo regalis</i> )	Ferruginous hawk nest in grasslands, shrublands and forest lands. They breed in grasslands, sagebrush country, saltbush-greasewood shrublands, and edges of pinyon-juniper forests at low to moderate elevations. They winter in grasslands or deserts with abundant rabbits, gophers, or prairie dogs. Suitable nesting habitat occurs on the three allotments. There are no known impacts of livestock on ferruginous hawks.
Golden eagle ( <i>Aquila chrysaetos</i> )	Golden Eagles live in open and semi open country with native vegetation. They are found mainly in mountainous areas, canyonlands, rimrock terrain, and riverside cliffs and bluffs. They nest on cliffs and steep escarpments in grassland, chapparal, shrubland, forest, and other vegetated areas. The allotments are within their year-round habitat range. There is no suitable nesting habitat for Golden Eagles on the three allotments. They may fly and hunt over the area of the allotments. There are no known impacts of livestock on golden eagles.

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BLM Sensitive Species	
Species	Comments
Pinyon jay ( <i>Gymnorhinus cyanocephalus</i> )	Pinyon jay occurs in pinyon-juniper woodland. This habitat is available on the allotments in limited amounts; therefore, this species may be impacted by livestock browsing seedling trees or low-hanging branches. This species is known to travel vast distances in response to localized abundance or shortages of forage. The objectives set in this document will not alter the production of forage for this species, resulting in impacts that are less than significant.
<b>Fish</b>	
There are no BLM sensitive fish known to occur in the BLM-administered portions of the Puerco Ridge, Hardscrabble Wash and Long H Ranch allotments.	
<b>Invertebrates</b>	
There are no BLM sensitive invertebrates known to occur in the BLM-administered portions of the Puerco Ridge, Hardscrabble Wash and Long H Ranch allotments.	
<b>Mammals</b>	
Arizona myotis ( <i>Myotis occultus</i> )	Arizona myotis occurs in ponderosa pine and oak-pine woodlands near water. Little of this habitat exists on these allotments. The species will not be
Gunnison's prairie dog ( <i>Cynomys gunnisoni</i> )	Gunnison's prairie dog is not known to be present on the allotments; however, suitable habitat does exist and may be colonized if the species becomes more abundant in the surrounding area.
Pale Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> )	This species occurs in pine forests and arid desert scrub, always near caves or other roosting sites. Little of this habitat occurs on the allotments. This species will not be impacted.
Spotted bat ( <i>Euderma maculatum</i> )	Spotted bats inhabit desert scrub and open forests and are always associated with a water source such as a spring, river, creek, or lake. Little of this habitat occurs on the allotments. This species will not be impacted.
<b>Reptiles</b>	
There are no BLM sensitive reptiles known to occur in the BLM-administered portions of the Puerco Ridge, Hardscrabble Wash and Long H Ranch allotments.	
<b>Plants</b>	
There are no BLM sensitive plants known to occur in the BLM-administered portions of the Puerco Ridge, Hardscrabble Wash and Long H Ranch allotments.	

Source: AZGFD Report, retrieved April 23, 2021 (AZGFD N.d.)

<b>Migratory Birds, Birds of Conservation Concern <sup>1,2</sup></b>	
<b>Species</b>	<b>Comments</b>
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Addressed as BLM Sensitive Species in table above.
Bendire's thrasher ( <i>Toxostoma bendirei</i> )	Found in desert habitats including arid grasslands, shrublands, and agricultural habitats. Prefers more open areas with shorter vegetation. The allotments provide adequate habitat to support this species if present. Low-to-moderate potential for this species to occur.
Chestnut-collared longspur ( <i>Calcarius ornatus</i> )	Found in shortgrass prairies, rangelands, and desert grasslands. Eastern Arizona contains wintering habitat for this species. The allotments provide a minimal amount of potentially suitable wintering habitat to support this species. Low potential for this species to occur.
Ferruginous hawk ( <i>Buteo regalis</i> )	Addressed as BLM Sensitive Species in table above.
Golden eagle ( <i>Aquila chrysaetos</i> )	Addressed as BLM Sensitive Species in table above.
Gray vireo ( <i>Vireo vicinior</i> )	Found in pinyon-pine/juniper, mesquite scrub, oak scrub, and chaparral habitats. They prefer hot, arid habitats that usually have dense brush from near the ground to six feet high. There is a low potential for this species to occur on the allotments.
Juniper titmouse ( <i>Baeolophus ridgwayi</i> )	Found mainly in dry, open pinyon-pine/juniper woodlands of the Great Basin and Upper Sonoran Zone. The species occurs with sagebrush, Joshua tree, and other understory shrub species. Older pinyon-pine/juniper trees are needed for nesting cavities. The allotments provide a minimal amount of low-quality pinyon-pine/juniper habitat to support this species. Low potential for this species to occur.
Pinyon jay ( <i>Gymnorhinus cyanocephalus</i> )	Addressed as BLM Sensitive Species in table above.
Prairie falcon ( <i>Falco mexicanus</i> )	Found near bluffs and cliffs for nesting, including in alpine habitat. Breeding habitats include grasslands, shrub steppe desert, areas of mixed shrubs and grasslands, or alpine tundra that supports their prey base. Foraging sometimes occurs in agricultural fields. The allotments lack most of their required habitat for nesting and breeding but may be used for opportunistic foraging. Low potential for this species to occur.

Source: AZGFD Report, retrieved April 23, 2021 (AZGFD N.d.); USDI USFWS, 2008

<sup>1</sup>The migratory bird species listed are species of particular conservation concern (e.g., Birds of Conservation Concern) that may occur on or near the allotment. It is not a list of every bird species that may be found in this location, nor a guarantee that all of the bird species on this list will be found on or near this location.

<sup>2</sup> Habitat information and determinations compiled from species profiles found on USFWS website. <https://ecos.fws.gov>

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<b>Species of Economic and Recreational Importance</b>	
<b>Common Name</b>	<b>Scientific Name</b>
America pronghorn	<i>Antilocapra americana</i>
Scaled quail	<i>Callipepla squamata</i>
Mule deer	<i>Odocoileus hemionus</i>
Mountain lion	<i>Puma concolor</i>
Mourning dove	<i>Zenaida macroura</i>

Source: AZGFD Report, retrieved April 23, 2021 (AZGFD N.d.)