# United States Department of the Interior
# Bureau of Land Management
# Kingman Field Office

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### Rangeland Health Assessment

# Palmerita Ranch (#00092)

# Contents

## Abstract
This Rangeland Health Assessment is a stand-alone report designed to ascertain compliance with the Arizona Standards for Rangeland Health on the Palmerita Ranch allotment. Standard 1 is achieved on all but the Limy Slopes ecological site on the Palmerita Ranch allotment. Overall, one fourth of monitored key areas fail to achieve Standard 1. There are no springs to be evaluated for Standard 2 for the allotment and the stretch of the Santa Maria River flowing through the allotment has been rated as proper functioning condition. Standard 3 is achieved on all sites except for the Limy Fan and Loamy Slopes ecological sites of the Palmerita Ranch allotment. Overall, half of the monitored key areas in the Palmerita Ranch allotment did not achieve Standard 3.

## 1.0 Introduction:
The purpose of this land health evaluation is to determine whether the Arizona Standards of Rangeland Health (Standards) are being achieved on the Palmerita Ranch allotment and to determine if livestock are the causal factor for either not achieving or not making significant progress towards achieving land health standards. This evaluation is not a decision document, but a standalone report that records the analysis and interpretation of the available inventory and monitoring data. As part of the Rangeland Health Assessment process Desired Plant Community (DPC) objectives were established for the Biological Resources. The DPC objectives will assure that soil condition and ecosystem function described in Standards 1, 2 and 3 are met.

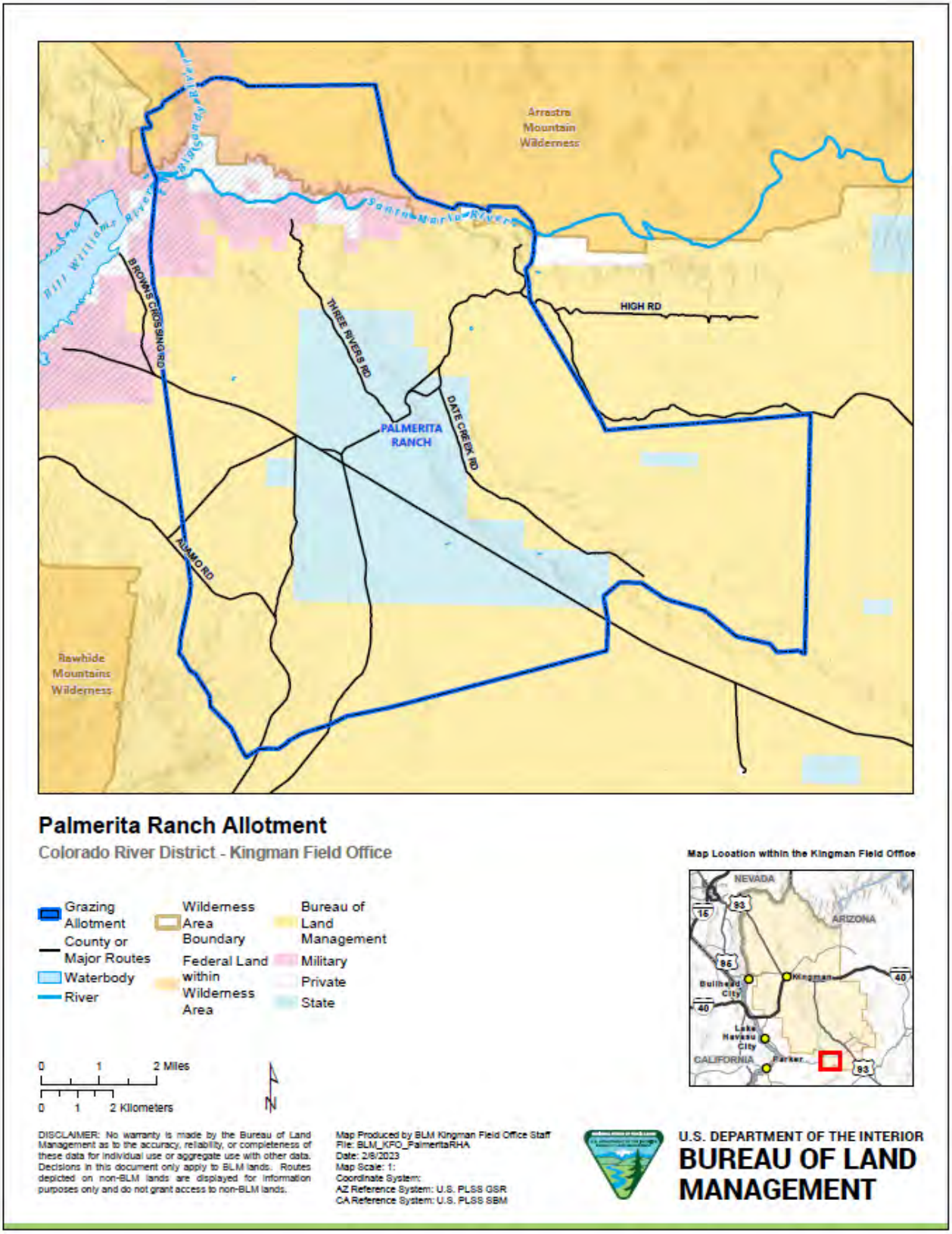
The Secretary of the Interior approved Arizona's Standards for Rangeland Health and Guidelines for Grazing Administration (Guidelines) in April 1997. The Decision Record, signed by the BLM State Director (April 1997) provides for full implementation of the Standards and Guides in Arizona BLM Land Use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

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

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

## 2.0 Complex Profile

### 2.1 Allotment Location
The Palmerita Ranch allotment area (Map 1) consists of 52,898 acres in the west-central portion of Arizona, that is northwest of the Phoenix Metropolitan Area. This area includes 39,655 acres of public land. The area is comprised of the desert valley that lies between the Harcuvar Mountains to the south and the Santa Maria River to the north. The area sits just east of Alamo Lake. Vegetation is comprised of Sonoran Desert Scrub with Mojave Desert Scrub influences. Typical species include Joshua tree (*Yucca brevifolia*), saguaro (*Carnegiea gigantea*), palo verde (*Parkinsonia microphylla*), creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), big galleta grass (*Hiliaria rigida*), Mormon tea (*Ephedra trifurca*), and cholla (*Cylindropuntia spp.*). Average yearly precipitation ranges from 3-7 inches in the lowest elevations (~1,100 ft.) to 10-13 inches in the highest (~3,800 ft.). About half of the precipitation is received in the winter and with an equal amount received during erratic summer monsoons.




**Map 1:** Santa Maria River South Complex Allotments

## 2.2 Physical Description

### 2.2.1 Allotment Acreages

The acreages of the allotment are listed in Table 1.

**Table 1:** Allotment Acreages

| Land Classification | Palmerita Ranch |
|---|---|
| BLM Acres | 31,792 |
| State Acres | 11,397 |
| Other Federal Acres | 7,863 |
| Private Land Acres | 1,846 |
| Total Acres | 52,898 |

### 2.2.2 Climate Data

Climate data for this complex are taken from the Western Regional Climate Center data available at www.wrcc.dri.edu. The data are based on the National Oceanic and Atmospheric Administration (NOAA) weather stations located near Aguila, Wickenburg, Congress, and Alamo Lake, AZ. Climate data was collected at these sites between the years 1908 and 2016. Average mean air temperature for all four sites is 66.9°F, with an average daily maximum temperature of 82.25°F and an average daily minimum temperature of 50.75°F.

### 2.2.3 Precipitation

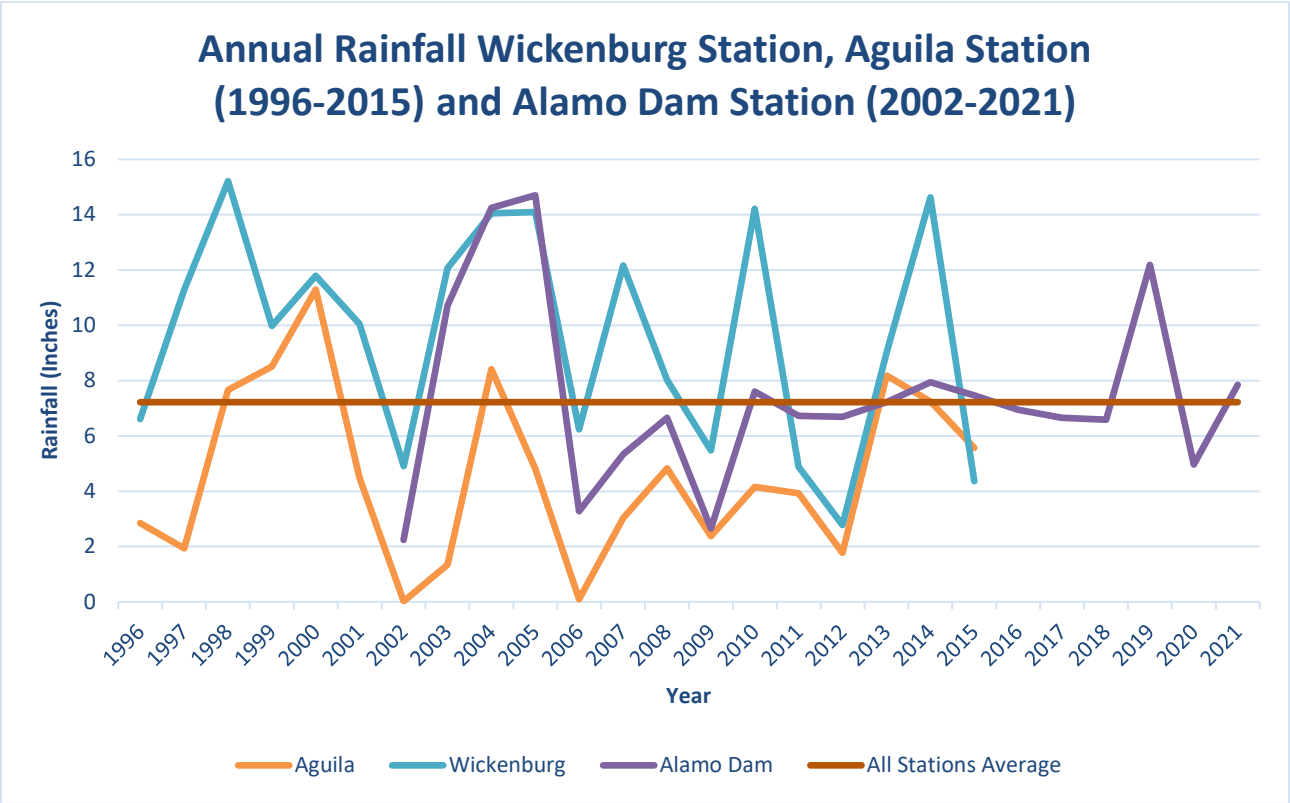
Precipitation data for the Palmerita Ranch allotment is taken from the Western Regional Climate Center. The data is based on four National Oceanic and Atmospheric Administration (NOAA) located in near the Complex (Table 2). Only the stations in the area with 10 or more years of precipitation data available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

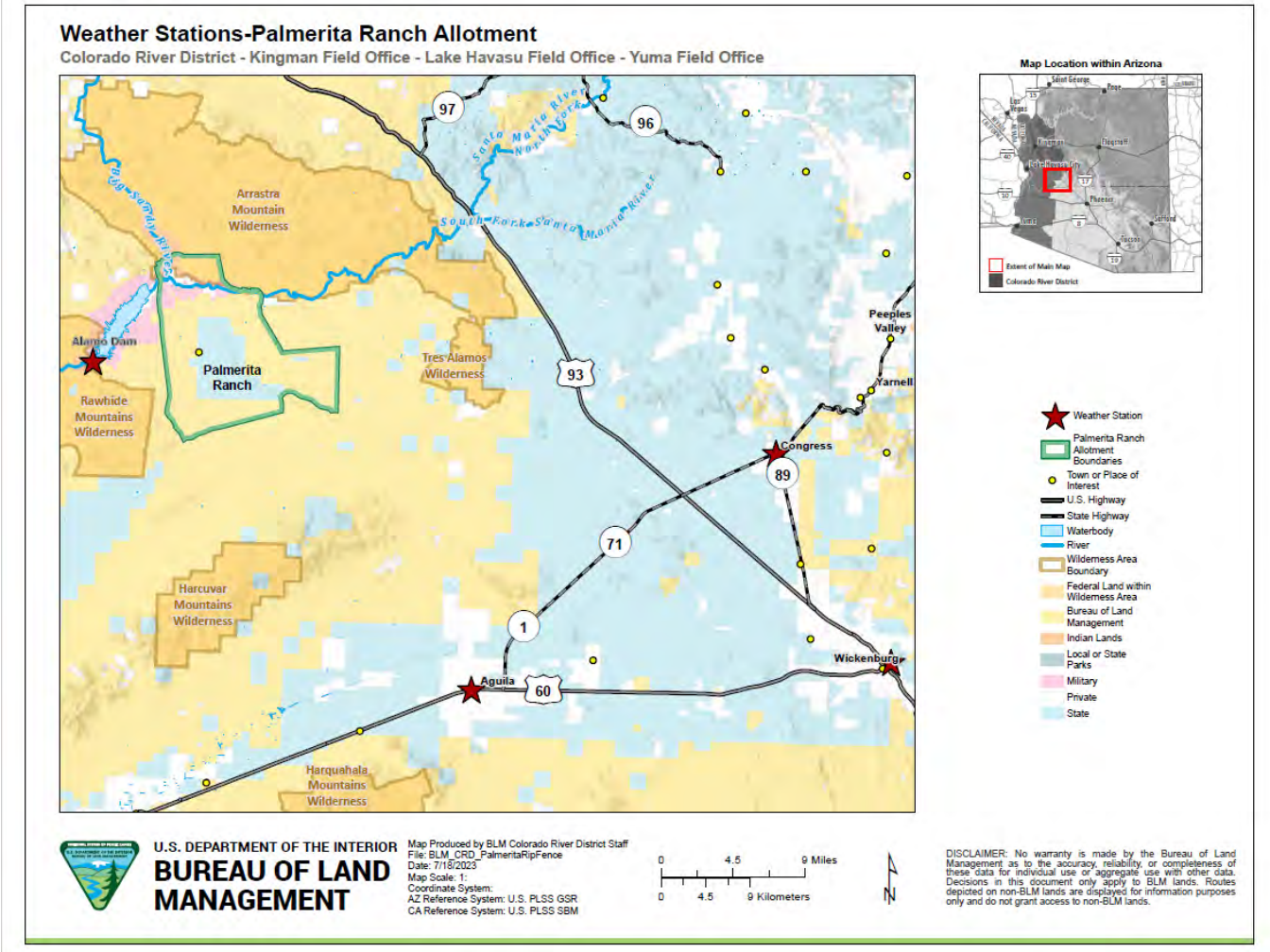
**Table 2:** NOAA rain gauge stations

| Station Name | Station Number | Elevation | Years of Record | Mean Annual Rainfall |
|---|---|---|---|---|
| Aguila | 020060 | 2,180 | 92 | 8.37 |
| Alamo Dam | 020100 | 1,290 | 41 | 8.52 |
| Congress | 022020 | 3,030 | 10 | 11.97 |
| Wickenburg | 029287 | 2,070 | 107 | 11.11 |

Annual rainfall totals for the last 20 years were compiled from three of the four weather stations within the area. The Congress station only had 10 years' worth of data which was collected from 1970 to 1980 and does not give any relevant data that would reflect recent climatic conditions. The graphs below (Figure 1) display annual rainfall collected from the Aguila, Alamo Dam, and Wickenburg stations from 1996 through 2021. The average rainfall across these three stations for the area from 1996 through 2021 was 7.22 inches.

**Figure 1:** Annual rainfall totals for the rain gauge stations around Palmerita Ranch Allotment






**Map 2:** Palmerita Ranch Allotment Weather Stations

## 2.2.4 Soils Data

The soils of the Palmerita Ranch allotment were determined three soil maps produced by NRCS: the 1976 Soil Survey of Yavapai County, AZ, Western Part, the 2019 Soil Survey of Mohave County, AZ, Southern Part, and the InProgress Soil Survey of Kofa Area, AZ, Parts of La Paz and Yuma Counties. Field truthing was used in conjunction with the NRCS soil surveys to confirm the soils of the complex. Descriptions and quantifications of soil features and systematics can be found in the 1993 Soil Conservation Service Soil Survey Manual (Soil Survey Division Staff 1993).

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

**Map Unit:**
Brios coarse sand, 3 to 35 percent slopes

Brios coarse sand, 3 to 35 percent slopes occurs on flood plains and alluvial fans, typically in very flat areas. The Map unit is 90 percent Brios soils with only 10 percent Typic Haplogypsid soils occurring in the basin floor remanents. Brios soils are very deep and excessively well-drained. Vegetation in this unit is sparse and consists of four-wing saltbush, mesquite, creosotebush, big galleta and arrowweed.

The ecological site associated with this soil is Loamy Slopes 7-10 inches precipitation zone.

**Map Unit:**
Brios gravelly coarse sand, 0 to 5 percent slopes

Brios gravelly coarse sand, 0 to 5 percent slopes occurs on alluvial fans. The map unit is about 80 percent Brios soil, 10 percent Momoli soil and 10 percent Denure soil. Soils in this unit are deep to very deep and somewhat excessively to excessively well-draining. Brios soils are found on alluvial fans and flood plains. Momoli soils occur on stream and fan terraces, and Denure soils are on alluvial fans, relict basin floors, stream terraces, or fan piedmonts. Brios soils have a sandy loam texture. They typically grow four-wing saltbush, mesquite, creosotebush, big galleta and arrowweed. Momoli soils are very gravelly fine sandy loam and are about 70 percent covered with gravel. Vegetation for this soil type consists of creosotebush, triangle bursage, ironwood, bush muhly, threeawn, big galleta, and turkshead. Denure soils are typically gravelly sandy loam. They occur mostly on rangelands and tend to grow cresotebush, white bursage annual forbs and grasses.

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

**Map Unit:**
Gunsight-Beeline-Rock outcrop complex, 5 to 90 percent slopes

Gunsight-Beeline-Rock outcrop complex, 5 to 90 percent slopes occurs fan piedmonts, fan remnants, backslopes and shoulders. The map unit is about 45 percent Gunsight soil, 20 percent Beeline soil and 15 percent Hickiwan soil with about 20 percent of the unit covered in rocky outcrops. Gunsight soil is a very gravelly loam that is found on fan or stream terraces and usually have a layer of gravel covering 50 to 60 percent of its surface. It is somewhat excessively drained, very deep and strongly calcareous. These soils usually formed from in stratified alluvium from mixed resources. Vegetation typical of this soil consists of creosotebush, ocotillo, paloverde, saguaro, cholla, and triangle bursage. Beeline soil is a shallow to very shallow soil that is well-drained and occurs on fan terraces and hillslopes. It is a very gravelly sandy loam with 40 percent surface cover of fine pebbles. Beeline is a well-draining soil formed in material weathered from sandy conglomerate. Native vegetation is mainly creosotebush, triangle bursage, ratany, big galleta, barrel cactus, saguaro, ocotillo, whitethorn, littleleaf paloverde, Mormon-tea and bush muhly. Hickiwan soil is a very shallow soil with hardpanning that occurs on relict fan and fan terraces. They form out of a mixed alluvium comprised of basalt, andesite and conglomerate. They are well-drained. Typical native vegetation includes creosotebush, cacti, bush muhly, ocotillo, triangle bursage, and white ratany.

The ecological site associated with this soil is Limy Slopes 7-10 inches precipitation zone.

**Map Unit:**
Denure complex, 1 to 5 percent slopes

Denure complex, 1 to 5 percent slopes occurs on alluvial fans, along slopes to wide basin floors. The map unit is about 45 percent Denure soil that occurs along a footslope, 35 percent Denure soil along a toeslope, 10 percent Momoli soil and 10 percent Casa Grande soil. Denure soils are well-drained to somewhat excessively drained. They are gravelly sandy loam that occur on alluvial fans, relict basin floors, stream terraces, or fan piedmonts. These soils formed in alluvium from acid and basic igneous rock and eolian deposits. Vegetation at this site consists of creosotebush, white bursage, annual forbs and grasses. Momoli soils occur on stream and fan terraces. Momoli soils are very deep, very gravelly fine sandy loam and are about 70 percent covered with gravel. Vegetation for this soil type consists of creosotebush, triangle bursage, ironwood, bush muhly, threeawn, big galleta, and turkshead. Casa Grande soils are very deep, well-drained fine sandy loam that is found in on fan terraces and relict basin floors. These soils formed in old alluvium from a wide variety of rocks including granite, rhyolite, andesite, quartzite and possibly some limestone and basalt. Native vegetation for this soil includes desert saltbush, linear-leaf saltbush, wolfberry and scattered mesquite.

The ecological site associated with this soil is Limy Fan 7-10 inches precipitation zone.

## 2.3 Biological Resources

### 2.3.1 Major Land Resource Areas

The Palmerita Ranch allotment lies within Major Land Resource Area (MLRA) 40, Sonoran Basin and Range and more specifically this area is part of the Colorado Sonoran Desert Common Resource Area (CRA). MLRAs are described in USDA NRCS Agriculture Handbook 296: “Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin” (2006). MRLAs describe, on a large-landscape scale, the physiography, geology, climate, water, soils, biological resources and general land use. Ecological Site Descriptions produced by the NRCS are organized by MLRA for reference purposes.

### 2.3.2 Ecological Sites and Associated Vegetation Communities

An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a specific kind and amount of vegetation. It is the product of all the environmental factors responsible for its development, and it has a set of key characteristics (soils, hydrology, and vegetation) that are included in the ecological site description. Development of the soils, hydrology, and vegetation are all interrelated.

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

Ecological Site Descriptions that occur within the Palmerita Ranch allotment are provisional and are changing/updating.

Limy Fan 7-10” p.z. Site ID: R040XB207AZ

Limy Fan 7-10” p.z. site makes up 5,217 acres (9.9%) of the Palmerita Ranch allotment. This site occurs on nearly level to gently sloping fan terraces and old stream terraces no longer flooded, with slopes ranging from 1 to 3 percent, and elevations between 1000 and 2000 feet. These are deep soils that are calcareous throughout and formed in loamy alluvium of moderate age and from mixed origins. Soil surface texture

ranges from gravelly loam, sandy loam, to fine sandy loam surface textures. Subsurface texture is loamy. Plant-soil moisture relationships are poor to fair.

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

Limy Slopes 7-10" p.z. Site ID: R040XB209AZ

Limy Slopes 7-10" p.z. site makes up 8,926 acres (12.3%) of the Palmerita Ranch allotment. This ecological site occurs on ridgetops and hillslopes ranging from 15 to 45 percent slope and elevations from 1000 to 2200 ft. These are moderately deep to deep gravelly calcareous soils the developed in alluvium of moderate age and mixed origins. The soil profile has upwards of 35% gravel content. Surface textures range from a gravelly sandy loam to extremely gravelly. Plant-soil moisture relationships are poor.

The ESD describes this plant community as a mixture of desert shrubs, cacti and perennial grasses. Annual grasses are also present but make up a small percentage of species composition. The dominant plants are bursage, brittlebush (Encelia farinose), and big galleta. Other grasses, cacti and shrubs that may be present are saguaro, creosotebush, prickly pear, cholla, bush muhly, and threeawns. Drought and heavy grazing will cause perennial grasses and forbs to start to disappear from the plant community. Most shrubby species in this ESD are unpalatable and less susceptible to change with heavier grazing pressure. Annual plant production is between 240 and 345 pounds of air-dry weight per acre depending on available moisture.

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

Sandy Loam Deep make up approximately 1,595 acres (1.7%) of the Palmerita Ranch allotment. This ecological site is found on fan and stream terraces with slopes ranging from 1 to 8 percent and elevations from 1,200 to 2,000 ft. Soils are deep formed from sandy alluvium of mixed origins. The soils are sandy loam throughout with non-clayey cambic horizons. These soils are non-calcareous in the first 4 to 6 inches. The soil surfaces are loamy with few gravels. Plant-soil moisture relationships are fair to good.

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

Loamy Slopes 7-10" p.z. Site ID: R040XB212AZ

Loamy Slopes 7-10" p.z. sites make up approximately 8,427 acres (8.3%) of the Palmerita Ranch allotment. This site occurs on hillslopes and ridgetops with slopes ranging between 15 and 45 percent, and between 1200 and 2600 feet elevation. The soil is moderately deep to deep. At moderate depths it is loamy and non-calcareous. The surface texture is very gravelly loamy to extremely gravelly clay loam with the surface soil being protected by gravel and rock cover. Plant-soil moisture relationship is fair to good.

The plant community described by this ESD consists of a diverse mixture of perennial and annual grasses, trees, forbs, shrubs and cacti. This diverse community is dominated by bursage, big galleta and bush muhly. There is also a mixture of desert trees such as foothill palo verde (*Parkinsonia microphylla*), shrubs such as

brittlebush (*Encelia farinosa*) and cacti such as buckhorn cholla with annual forbs and grasses that are common when moisture is available. Perennial grass species such as big galleta (*Hilaria rigida*) and bush muhly (*Muhlenbergia porteri*) may be present on this site but are highly dependent on summer and winter growing season conditions. Other plant species that may be common on this site are shrubs such as creosote and subshrubs such as burrobush (*Ambrosia dumosa*) and desert globemallow (*Sphaeralcea ambigua*). Heavy grazing causes perennial grasses and forbs to quickly disappear from the plant community described by this ESD. The annual plant production ranges between 293 and 496 pounds of air-dry weight per acre depending on available moisture.

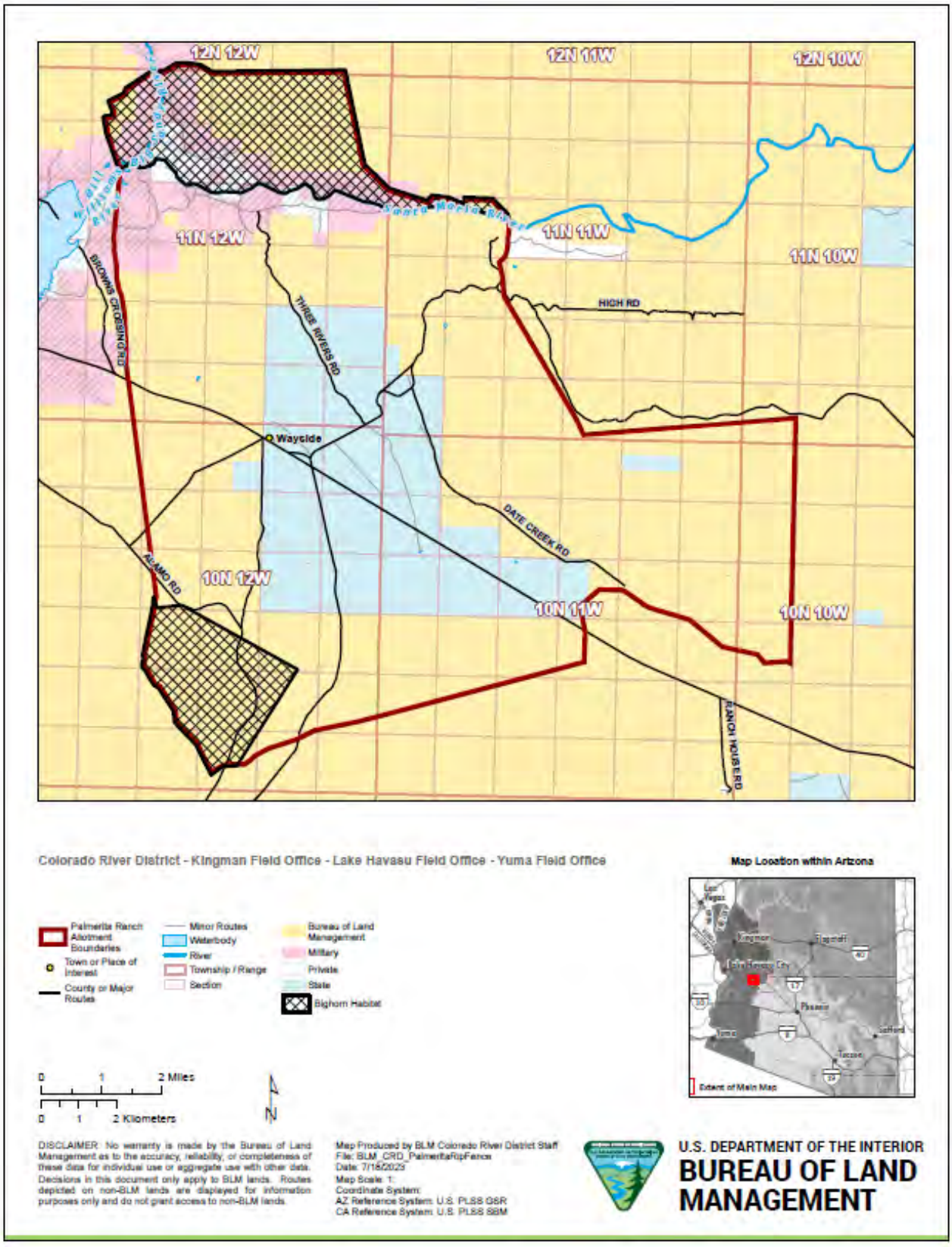
## 2.3.4 General Wildlife Resources

*Game Species and mammals*
Within the Palmerita Ranch allotment, suitable habitat exists for big game species such as desert bighorn sheep (*Ovis canadensis mexicana/nelsoni*, Map 3), mule deer (*Odocoileus hemionus,* Map 4) with year-round populations, elk (*Cervus canadensis*), javelina (*Pecari tajacu*), and mountain lion (*Puma concolor*). Common small game species include Gambel's quail (*Callipepla gambelii*) mourning dove (*Zenaida macroura*), white-winged dove (*Z. asiatica*), and cottontail rabbits (*Sylvilagus audubonii*). The Palmerita Ranch allotment also provides suitable habitat for common mammals including Harris' Antelope Squirrel (*Ammospermophilus harrisii*), beaver (*Castor canadensis*), bobcat (*Lynx rufus*), Kit Fox (*Vulpes macrotis*), Little Pocket Mouse (*Perognathus longimembris*), Southwestern River Otter (*Lontra canadensis Sonora*), raccoons (*Procyon lotor*), coyotes (*Canis latrans*), gray foxes (*Urocyon cinereoargenteus*), striped skunks (*Mephitis mephitis*), and badgers (*Taxidea taxus*). Bat species include the Brazilian Free-tailed Bat (*Tadarida brasiliensis*), Pocketed Free-tailed Bat (*Nyctinomops femorosaccus*), Western Red Bat (*Lasiurus blossevillii*), and Western Yellow Bat (*Lasiurus xanthinus*).

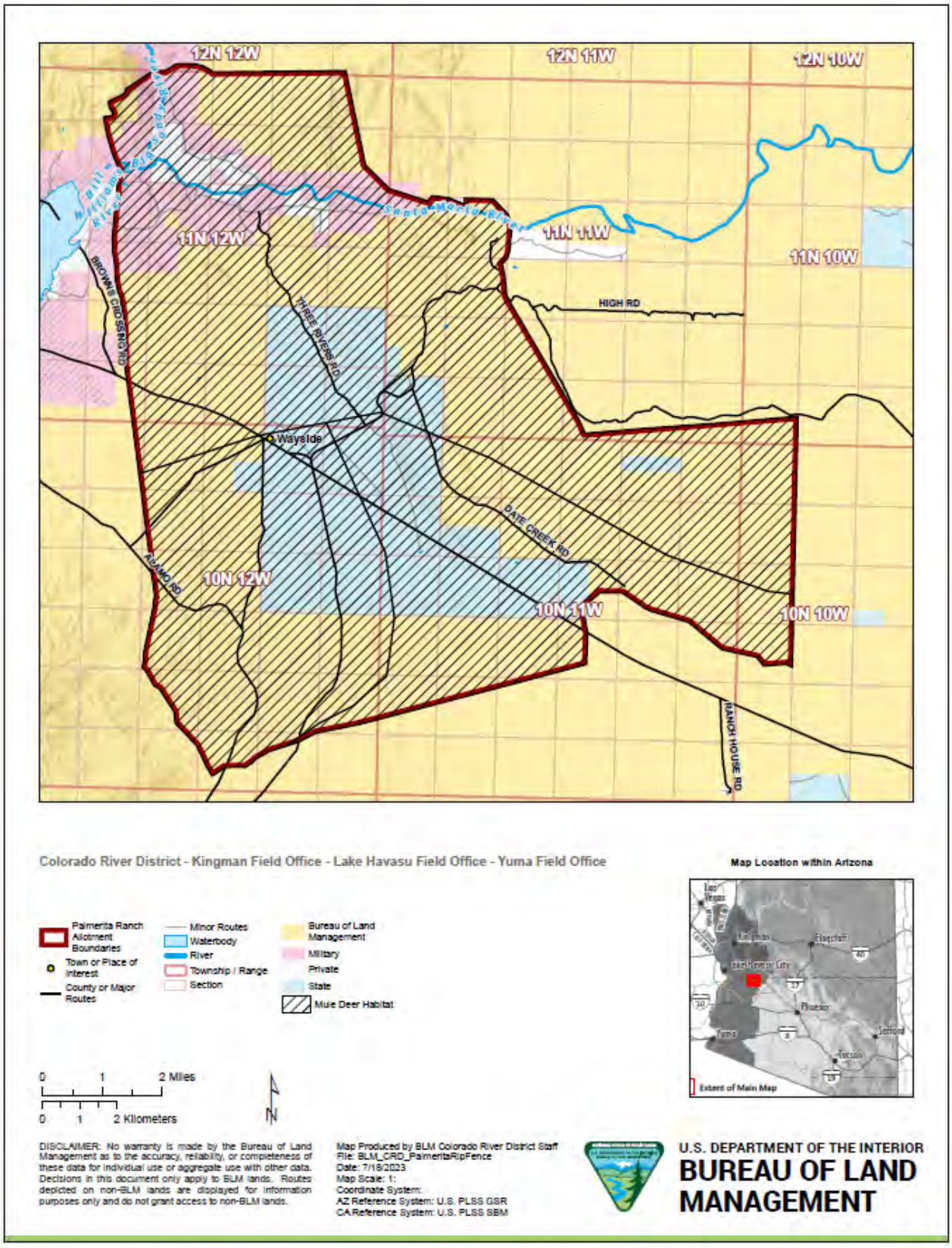
*Reptiles*
A variety of reptiles present in or near the Palmerita Ranch allotment allotments including side blotched lizard (*Uta stansburiana*), desert spiny lizard (*Sceloporus magister*), zebra-tailed lizard (*Callisaurus draconoides*), tiger whiptail lizard (*Aspidoscelis tigris*), gopher snake (*Pituophis catenifer*), coachwhip (*Masticophis flagellum*), western diamondback rattlesnake (*Crotalus atrox*), and Sonoran desert tortoise (*Gopherus morafkai*). Other species that may be present are Arizona Black Rattlesnake (*Crotalus Cerberus*), Arizona Night Lizard (*Xantusia arizonae*), Gila Monster (*Heloderma suspectum*), Gila Spotted Whiptail (*Aspidoscelis flagellicauda*), Regal Horned Lizard (*Phrynosoma solare*), Resplendent Shovel-nosed Snake (*Chionactis annulate*), Sonoran coral snake (*Micruroides euryxanthus*), Sonoran Whipsnake (*Coluber bilineatus*), and Variable Sand snake (*Chilomeniscus stramineus*), rosy boas (*Lichanura trivirgata*), chuckwallas (*Sauromalus ater*), and sidewinder rattlesnake (*Crotalus cerastes*).

*Aquatic and Riparian Obligate Species*
Alamo Lake, which is a National Wildlife Refuge (Bill Williams) and tributary and of the Santa Maria River, contains sportfish including largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), green sunfish (*Lepomis cyanellus*), tilapia (*Oreochromis aurea*), yellow bullhead (*Ameiurus natalus*), channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), black crappie (*Pomoxis nigromaculatus*), and threadfin shad (*Dorosoma petennse*). Other nonnative fish species including goldfish (*Carassius auratus*) and mosquitofish (*Gambusia affinis*) are also present. Historically, tributaries as well as mainstem portions of the Santa Maria River maintained viable native fish populations which consisted mainly of roundtail chub (*Gila robusta*), desert sucker (*Catostomus clarkii*), Sonora sucker (*Catostomus insignis*), longfin dace (*Agosia chrysogaster*), and speckled dace

(*Rhinichthys osculus*); however, since about 1995, these populations have been in decline (AGFD and USFWS 2011). Other known species are Sonoran mud turtle (*Kinosternon sonoriense*), lowland leopard frog (*Lithobates yavapaiensis*), and red-spotted toad (*Anaxyrus punctatus*). Nonnative bullfrogs




**Map 3:** Santa Maria River South Complex Desert Bighorn Sheep Habitat




**Map 4:** Santa Maria River South Complex Mule Deer Habitat

(*Lithobates catesbeianus*) and crayfish (*Oronectes spp*.) are also known to be present in the project area.

*Raptors and Birds of Conservation*
Xero-riparian and upland habitat on the Palmerita Ranch allotment supports red-tailed hawks (*Buteo jamaicensis*), and a nesting Bald Eagle (*Haliaeetus leucocephalus*). Owl species may include the western screech owl (*Megascops kennicottii*), great-horned owl (*Bubo virgineanus*), elf owl (*Micrathene whitneyi*), and the barn owl (*Tyto alba*). Birds that occur in the riparian habitat include Ash-throated flycatcher (*Myiarchus cinerascens*), Bell's vireo (*Vireo bellii*), Clark's Grebe (*Aechmophorus clarkii*), common yellowthroat (*Geothlypis trichas*), Lucy's warbler (*Oreothlypis luciae*), Marbled Godwit (*Limosa fedoa*), song sparrow (*Melospiza melodia*), yellow warbler (*Setophaga petechia*), Western Grebe (*aechmophorus occidentalis*), and Willets (*Tringa semipalmata*). Other birds that may be in the area include Abert's Towhee (*Melozone aberti*), American Bittern (*Botaurus lentiginosus*), Arizona Bell's Vireo (*Vireo bellii arizonae*), Bendire's Thrasher (*Toxostoma bendirei*), black-tailed gnatcatcher (*Polioptila melanura*), Black-chinned Sparrow (*Spizella atrogularis*), black-throated sparrow (*Amphispiza bilineata*), Brewer's Sparrow (*Spizella breweri*), Brown-crested Flycatcher (*Myiarchus tyrannulus*), cactus wren (*Campylorhynchus brunneicappillus*), Common Black Hawk (*Buteogallus anthracinus*), Costa's Hummingbird (*Calypte costae*), Eastern Meadowlark (*Sturnella magna*), Gila Woodpecker (*Melanerpes uropygialis*), Gray Flycatcher (*Empidonax wrightii*), Gray Vireo (*Vireo vicinior*), Juniper Titmouse (*Baeolophus ridgwayi*), Lawrence's Goldfinch (*Carduelis lawrencei*), Le Conte's Thrasher (*toxostoma lecontei*), lesser goldfinch (*Spinus psaltria*), Lincoln's Sparrow (*Melospiza lincolnii*), Marsh Wren (*Cistothorus palustris*), northern mockingbird (*Mimus polyglottos*), Pacific Wren (*Troglodytes pacificus*), Red-naped Sapsucker (*Sphyrapicus nuchalis*), Rufous-winged Sparrow (*Aimophila carpalis*), Sage Thrasher (*Oreoscoptes montanus*), Swainson's Hawk (*Buteo swainsoni*), and Williamson's Sapsucker (*Sphyrapicus thyroideus*).

### 2.3.5 Threatened and Endangered Species, Critical Habitat, and Special Status Species

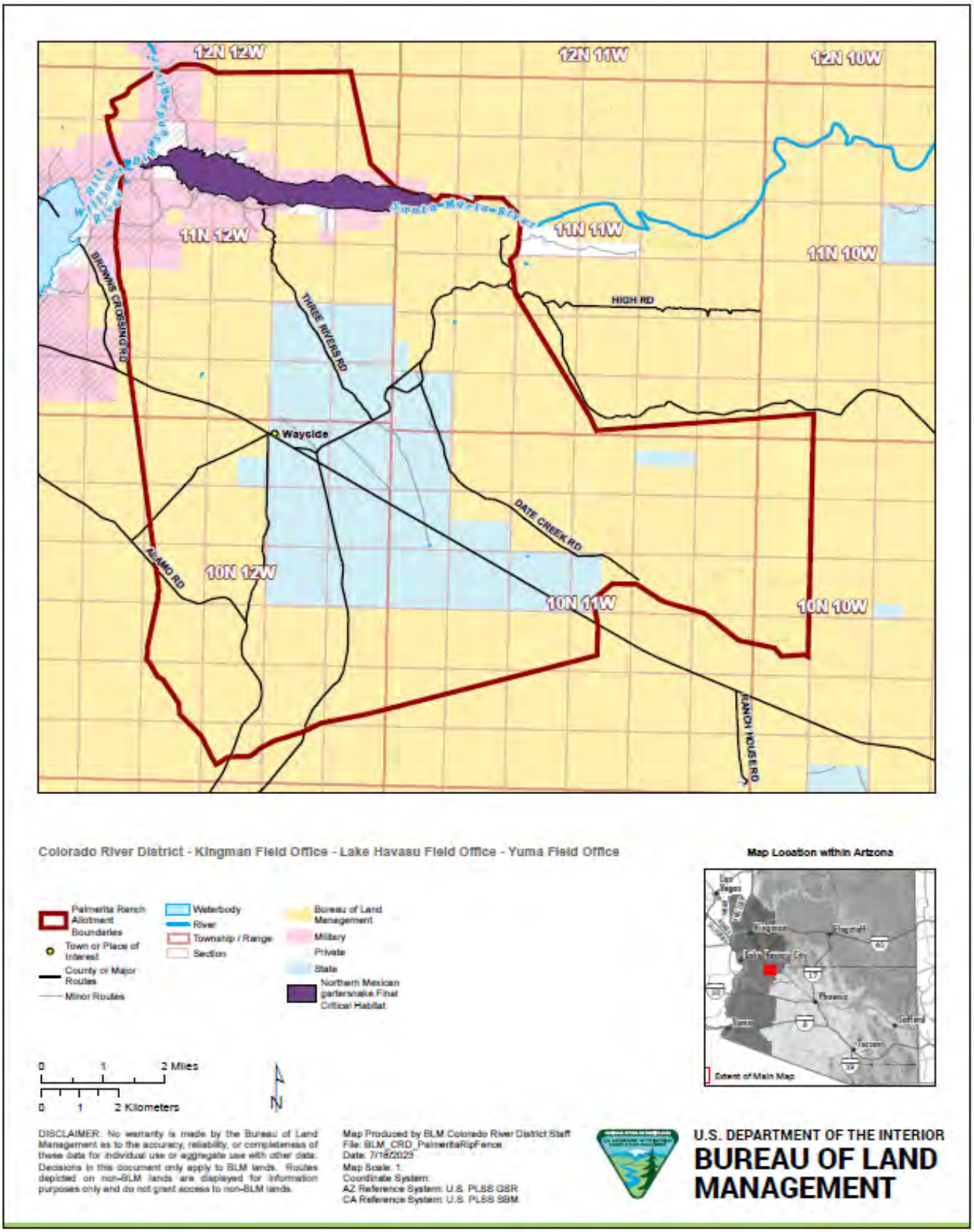
## Threatened and Endangered Species (T&E) and Critical habitat

A Biological Assessment (See Appendix D) was done for the Palmerita Allotment and covers species and habitat information on T&E species for the Northern Mexican gartersnake (*Thamnophis eques megalops*), Southwestern willow flycatcher (*Empidonax traillii extimus*), and Yellow-billed cuckoo (*Coccyzus americanus*). The Palmerita Ranch allotment has all three species including designated critical habitat for the Northern Mexican gartersnake and Southwestern willow flycatcher. The California Least Tern (*Sterna antillarum browni*) and the Yuma Clapper/Ridgway's Rail (*Rallus longirostris yumanensis*) have potential to occur in the project area but is unlikely due to lack of supportable habitat.

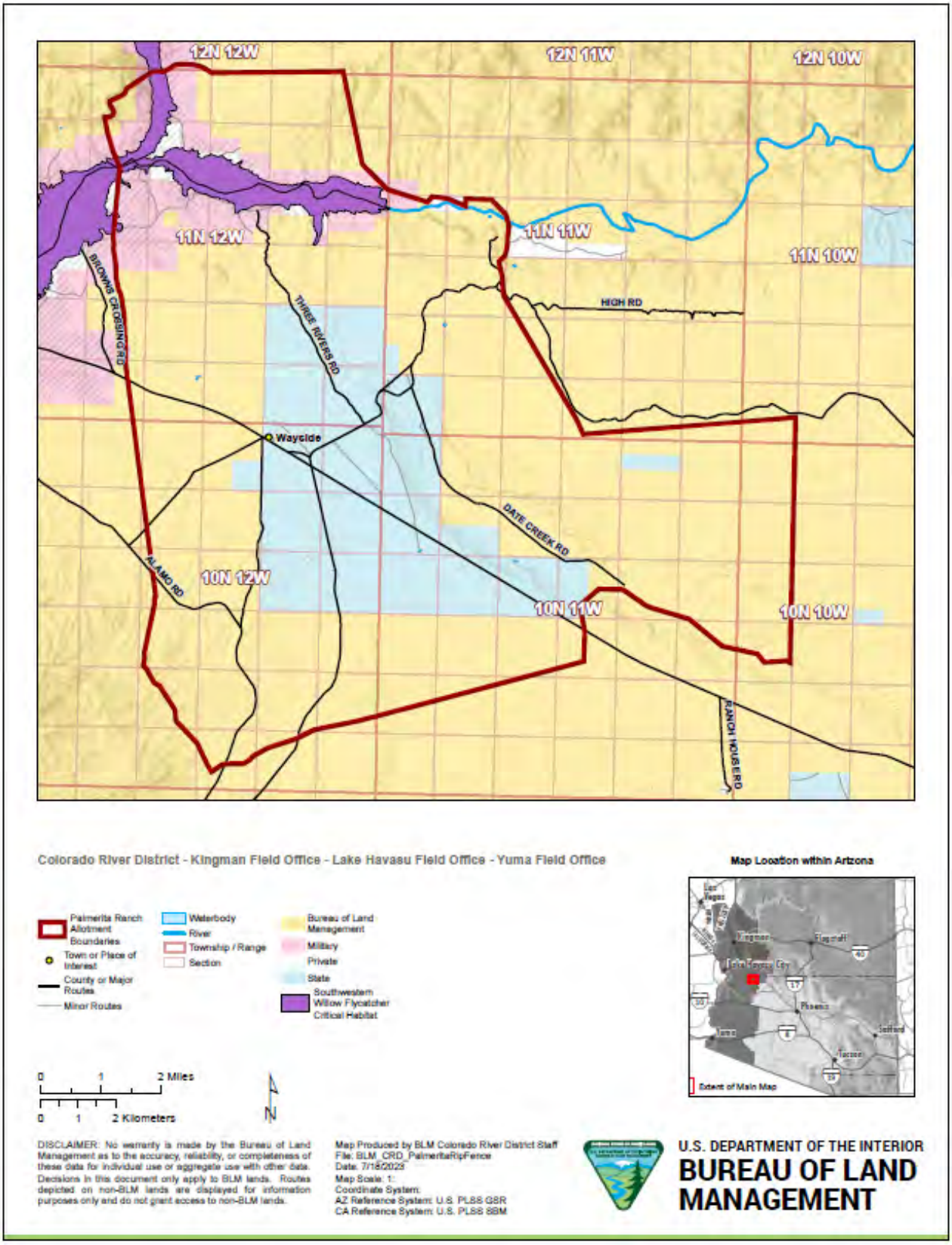
*Northern Mexican gartersnake*
Northern Mexican gartersnake (*Thamnophis eques megalops*) (NMGS) are an Endangered Species Act (ESA) listed species (Threatened) with 29 known historical localities for the NMGS in the United States. The only viable populations where the subspecies remains reliably detected are all located in Arizona. Final critical habitat (Map 5) for the NMGS was designated on April 28, 2021 and included the Santa Maria River. The NMGS has been documented on the Bill Williams, Santa Maria, and Big Sandy Rivers.

*Southwestern Willow Flycatcher*

Southwestern willow flycatcher (*Empidonax traillii extimus*) (SWIFL) are an Endangered Species Act (ESA) listed species (Endangered) with four subspecies of willow flycatcher recognized in North America, with each subspecies occupying distinctly different breeding ranges and varying slightly in color and morphology. New designation of critical habitat (Map 6) was designated in January 2013 and includes the Big Sandy




**Map 5:** Santa Maria River South Complex Northern Mexican Gartersnake Designated Critical Habitat




**Map 6:** Santa Maria River South Complex Southwestern Willow Flycatcher Designated Critical Habitat

River and the Santa Maria River. The SWIFL has been documented on the Big Sandy and Santa Maria Rivers with a recovery plan in place for these areas.

*Yellow-billed cuckoo*

Yellow-billed cuckoo (*Coccyzus americanus*) (YBCU) are an Endangered Species Act (ESA) listed species (Threatened) believed to have been widespread and locally common in Arizona. However, much of the historical riparian habitat throughout the state has been degraded or destroyed reducing numbers over the past 50 years. critical habitat was designated in 2021 and includes the Big Sandy River, north of the Palmerita Ranch allotment. The YBCU has been documented on the Bill Williams, Santa Maria, and Big Sandy Rivers.

**Special Status Species (SSS)**

*Monarch Butterfly*

Monarch Butterfly (*Danaus plexippus*) is a candidate species under consideration for official listing. Species are found throughout Arizona and typically breed year-round. Monarchs lay their eggs on their obligate milkweed host plant (primarily Asclepias spp.). There is potential for milkweed to occur within the Palmerita Ranch allotment and there for monarch may be at risk due to habitat loss and degradation.

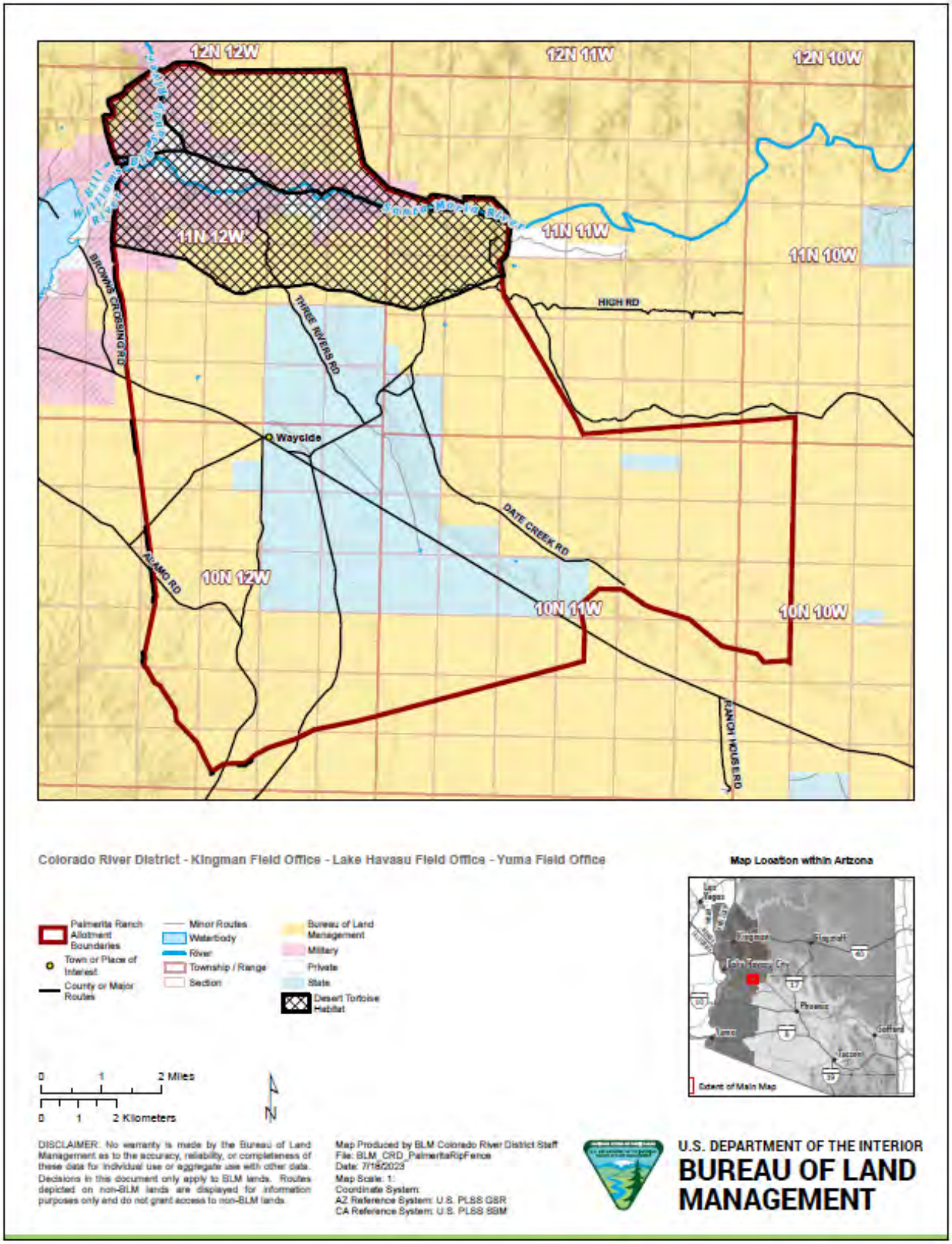
*Sonoran Desert Tortoise*

Sonoran desert tortoises (*Gopherus morafkai*) are a BLM sensitive species that may occupy upland areas in the Palmerita Ranch allotment. Tortoises tend to occupy hillsides and ridges with outcrops of large boulders as well as incised washes possessing caliche caves but may be found in lower densities elsewhere. Desert washes are important to Sonoran desert tortoises as they provide exposed banks with variable aspects, exposed caliche caves for locating burrows, and xeroriparian vegetation for thermal cover (Oftedal 2002). Their diet consists of annual forbs (30.1%), perennial forbs (18.3%), grasses (27.4%), woody plants (23.2%) and prickly pear fruit (1.1%) (Van Devender et al. 2002).

The Palmerita Ranch allotment contains one of (Category II) the three categories of desert tortoise habitat (Table 3 and Map 7). Category II (CATII) habitat is defined with the goal to maintain stable, viable populations and halt further declines in tortoise habitat values. The criteria for CATII are: 1) Habitat that may be essential to the maintenance of viable populations; 2) Habitat where most conflicts are resolvable; and 3) Habitat that contains medium to high densities of tortoises or low densities contiguous with medium or high densities. Category III (CATIII) habitat is defined with goals to limit tortoise habitat and population declines to the extent possible by mitigating impacts. The criteria for CATIII are: 1) Habitat that is not considered essential to the maintenance of viable populations; 2) Habitat where most conflicts are not resolvable; and 3) populations are low to medium density and not contiguous with medium or high density.

| Allotment | Catgory I Acres | Catgory II Acres | Catgory III Acres |
|---|---|---|---|
| Palmertia | 0 | 6,815 | 0 |

**Table 3:** Desert Tortoise Habitat Acreages by Allotment




**Map 7:** Santa Maria River South Complex Sonoran desert tortoise habitat categories

Arizona myotis (*Myotis occultus*)
Species is observed in higher elevations such as the Mojave and likely along the lower Colorado River Valley. They hunt over low water for flying aquatic insects and have been observed foraging under large cottonwoods. They typically are found in ponderosa pine and oak-pine woodland near water but are also found near permanent water or in riparian forests. They roost in tree cavities and crevices during the day and colonize on slopes with more exposure to solar heating. Recent mitochondrial DNA and morphological evidence has deemed this species to be specifically distinct by monophyletic lineage. (AZGFD 2011)

California leaf-nosed bat (*Macrotus californicus*)
This is the smallest species of Myotis in Arizona. Their range is throughout the state, but less common in higher mountain ranges. They roost in crevices and cracks in canyon walls, under loose bark or old snags, and sometimes in caves and mine shafts. They forage near water and over desert scrub oak to oaks and long lower edge conifers. (AZGFD 2004)

Cave myotis (*Myotis velifer*)
Closely related to the Yuma Myotis and identified as one of the larger Myotis species. Located south of Mogollon Plateau from Lake Mohave and around the Burro Creek area. Species are colonial and roost in clusters near entrances and in caves and mines, tunnels, under bridges, and sometimes buildings near water. Shortly after exiting roost, they seek water to drink, then forage within desertscrub habitat. (AZGFD 2002)

Greater Western Bonneted Bat (*Eumops perotis californicus*)
One of six North American Species of Eumops with one of two found in Arizona. They are found in all Arizona counties except Yavapai, Navajo, Apache, and Santa Cruz. This bat can tolerate temperatures between $100^{O}$ – $102^{O}$F without undue heat stress. They roost in lower and upper Sonoran desertscrub near cliffs, preferring rugged canyons with abundant crevices. This bat prefers to forage over large open bodies of water. (AZGFD 2014)

Spotted bat (*Euderma maculatum*)
This species is a monotypic genus and has a distinct black and white color patter with enormous pink ears. They are distributed throughout central western North America with specimens observed in the northwestern area of Arizona. This bat has been found from low desert in southwestern Arizona to high desert and riparian habitats in northwestern Arizona. Roost sites are poorly known but seem to prefer crevices and cracks in cliff faces. (AZGFD 2003)

Townsend's big-eared bat (*Corynorhinus townsendii*)
One of two species in the genus Corynorhinus that occurs in North America, and the only one that occurs in Arizona (widespread). Species prefers to hang from open ceilings and do not use cracks or crevices to roost. Roost sites during the day are found in caves and mines from desertscrub up to woodlands and coniferous forests with night roosts often in abandoned buildings. (AZGFD 2003)

Yuma Myotis (*Myotis yumanensis*)
The species are often confused with M. lucifugus as they appear to be closely related, however, genetic studies have shown the two to be distinct species. One of the smallest species of myotis with no sexual dimorphism. They are found throughout most of the state, but not in north or southeastern parts of the state. They are typically found over water where they forage for food and roost on rocky cliff walls. They also colonize in large groups in caves, mines, bridges, etc. They are found in a wide variety of upland and lowland habitats, including riparian, desertscrub, moist woodlands and forests. (AZGFD 2011)

Arizona Toad (*Anaxyrus microscaphus*)
Species is found east to west central Arizona, canyons, and flood plains south of the Mogollon Rim, and occur in Apache, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, and Yavapai counties. They are found in riparian habitats as low elevations within sandy marginal zones within stream corridors and adjacent terraces with cottonwoods, willows, and live oaks. Their desired plant community is upland desert and evergreen woodland and commonly associated with lower elevation riparian areas with Populus fremontii, Salix spp., and Baccharis spp. (AZGFD 2020)

American Peregrine Falcon (*Falco peregrinus anatum*)
This species is the only subspecies known to breed in Arizona, anywhere sufficient prey is available near cliffs. Optimum peregrine habitat is generally considered to be steep, sheer cliffs overlooking woodlands, riparian areas or other habitats supporting avian prey species in abundance. The generally feed on birds and to a lesser extent preys upon bats. (AZGFD 2002)

Ferruginous Hawk (*Buteo regalis*)
This species is a monotypic species with no subspecies recognized. They breed in northern Arizona but can been seen throughout the state. Their habitat consists of open areas with scrublands and woodlands, grasslands, and semidesert grassland. They prey on rabbits, ground squirrels, and gophers. (AZGFD 2013)

Gilded Flicker (*Colaptes chrysoides*)
Gilded Flickers are typically found in stands of large cacti of Sonoran Desert habitat where they nest in cacti such as saguaros. They forage on ground dwelling insects and fruit and seed when insects are not present.

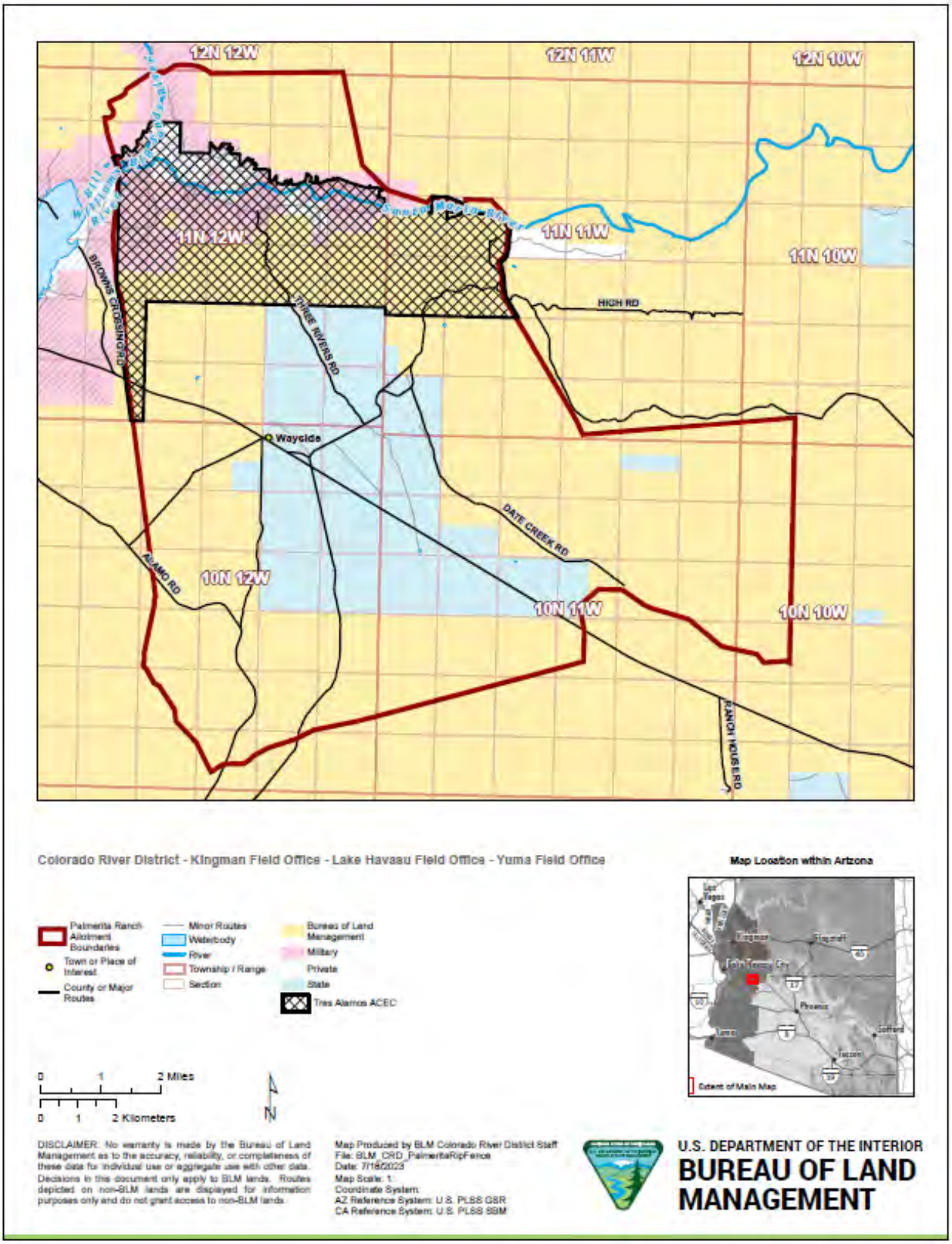
Western Burrowing Owl (*Athene cunicularia hypugaea*)
This is the only sub-species that occurs in Arizona and western North America. Species is found in open areas year-round from broad valleys near Seligman, along the bottomlands of Colorado River, the lower Colorado River valley, and Yuma area. The prefer well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals. They feed primarily on large insects and small mammals, as well as fish, reptiles, amphibians, birds, and even prickly pear cactus seeds. (AZGFD 2021)

### 2.3.6 Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are areas within public lands that require special management actions to protect existing important and/or rare resources such as wildlife or historical cultural sites. The Three Rivers ACEC occurs within the Palmerita Ranch allotment. The 1997 Kingman Resource Management Plan (RMP) provides common guidelines for activities that take place on all Kingman Field Office ACECs and a subset of specific guidelines for each ACEC that are designed to facilitate their intended management purpose. Below is the description of the Three Rivers ACEC and the specific management guidelines.

**Three Rivers ACEC**

Location and description: The Three Rivers ACEC is in the northern portions of the Palmerita Ranch allotment covering 5,783 public acres (Table 4 and Map 9). It is approximately 28 miles south of Wikieup on the west side of highway 93. This area encompasses a portion of the Bill Williams Watershed and supports designated Critical Habitat for the above listed T&E species. Values are outstanding, existing, and potential riparian resources; threatened and endangered habitat; and recreation values. The specific management guidelines for the Three Rivers ACEC are:




**Map 9:** Santa Maria River South Complex Tres Alamos Areas of Critical Environmental Concern

- Manage livestock grazing to achieve threatened and endangered and riparian habitat desired plant community description objectives.
- Confine new major rights-of-ways to existing corridors.
- Prohibit road development within ½ mile of bald eagle aeries.
- Limit off-highway vehicle use in riparian areas to designated roads and trails.
- No intense recreation within ¼ mile of aerie from January 1 through June 1.
- Restrict activities and no intensive recreation within ¼ mile of aerie from January 1 through June 1.
- Prohibit helicopter flights within ½-mile aerie from January 1 through June 1.
- Monitor and assess habitat condition.
- Continue riparian area condition evaluation inventory and monitoring.
- Prohibit removal of native plants except for salvage operations.

| Allotment | Tresl Alamos |
|---|---|
| Palmertia | 5,783 |

**Table 4:** Areas of Critical Environmental Concern (ACECs) Acreages by Allotment

### 2.3.7 Wild and Scenic Rivers

Segments A and B of the Santa Maria River were identified in the Arizona Statewide Wild and Scenic Rivers Legislative Environmental Impact Statement (BLM, 1994) for possible inclusion into the National Wild and Scenic River System. Approximately 2.01 miles of Segment A is located within the Palmerita Ranch allotment. This monitoring segment of the Santa Maria River stretches from U.S. Highway 93 to Alamo Lake and has been found to possess free-flowing values, outstandingly remarkable values for scenic as well as fish and wildlife resources. Based on the free-flowing and outstandingly remarkable values, the segment's potential classification is "Wild" defined in BLM Manual 6400 as "rivers or sections of rivers free of impoundments and generally inaccessible except by trails, with watersheds or shorelines essentially primitive and waters unpolluted."

The Kingman Resource Management Plan and Final Environmental Impact Statement (BLM, 1993) identified protective management prescriptions for management of Segment A of the Santa Maria River and identified the following prescriptions that could be related to grazing management on BLM-administered public lands to protect the segment's free-flowing nature and its outstandingly remarkable scenic, recreational, and fish and wildlife values within a corridor ¼-mile wide from the normal high-water line on either side of the stream:

- Subject to valid existing rights and to the extent the BLM is authorized under law, no stream impoundments, diversions, channelization or riprapping would be allowed.
- No new roads would be constructed or authorized within ¼ mile of the normal high-water line.

Any future actions taken related to grazing management within the corridor identified for this segment would be subject to these management prescriptions and be analyzed in any future subsequent analysis conducted under the National Environmental Policy Act (NEPA).

### 2.3.7 Wilderness

The Arizona Desert Wilderness Act was signed into law by Congress in November 1990 and designated 1.1 million acres on BLM-administered public lands as Wilderness including nine wilderness areas managed by the Kingman Field Office. The Palmerita Ranch allotment contains the Arrastra Mountain Wilderness areas.

**Arrastra Mountain Wilderness**
The 128,651-acre Arrastra Mountain Wilderness is located in Mohave, Yavapai, and La Paz counties, 100 miles northwest of Phoenix and 70 miles southeast of Kingman, Arizona. This sprawling wildland encompasses imposing landscapes and unique natural features. The Poachie Range, which trends northwest-southeast through the north-central portion of the wilderness, rises to almost 5,000 feet. The gradual southern slopes of the range are interrupted by several isolated volcanic plugs and numerous drainages, several of which have been deeply incised into a bright orange mudstone.

The western and southern portions of the wilderness encompass more than 20 miles of the ephemeral Big Sandy and Santa Maria rivers. West of the Big Sandy River, the Artillery Mountains are dominated by the striking red Artillery Peak, a 1,200-foot-tall volcanic plug. The east side of the wilderness contains the uniquely pristine Peoples Canyon. Several springs here maintain a two-mile-long chain of deep, interconnecting pools densely shaded by hundreds of sycamores, willows and cottonwoods.

Grazing allotments located within the Arrastra Mountain Wilderness area include the D.G. Ranch (5,334 acres), Palmerita Ranch (4,247 acres), Santa Maria Community (27,821 acres), and the Tres Alamos Ranch (5,686 acres).

The Arrastra Mountain Wilderness area has no valid Wilderness Management Plan (WMP) proposed or approved due to a long history of appealed and litigated decisions regarding both the Range Improvement Maintenance (RIM) Plan and Wilderness Inholding Access. Therefore, management of grazing operations within this area would be deferred to the May 31, 1991, decision on Environmental Assessment AZ-026-91-14 for the Barnes' livestock grazing proposal which authorized 129 cattle yearlong and approved non-use of 111 cattle yearlong with a system of rotation to provide rest to portions of the allotment. The Kingman Resource Management Plan and Final Environmental Impact Statement (BLM, 1993) allocated all Wilderness closed to off-highway vehicle use. Access to range improvements, absent a WMP, would be evaluated and approved on a case-by-case basis using the Minimum Requirements Decision Guide and subsequent analysis under the National Environmental Policy Act (NEPA). Currently, there is no plan or funding allocation to complete a Wilderness Management Plan for Arrastra Mountain Wilderness and it is likely this will be the case into the future.

## 2.3.8 Recreational Resources

The Palmerita Ranch allotment is located within an Extensive Recreation Management Area (ERMA) as designated in the Kingman Resource Management Plan and Final Environmental Impact Statement (BLM, 1993) and is managed for a wide-array of dispersed recreational activities including primary uses such as off-highway vehicle (OHV) use and hunting; secondary uses of camping, picnicking, backpacking, viewing cultural sites, and wildlife watching; and tertiary uses of hiking, photography, geocaching, and rockhounding. The Palmerita Ranch allotment is best accessed from the small farming community of Wenden, AZ via a 36-mile paved road or from U.S. Highway 93 at mile marker 178.6 via the 35-mile semi-maintained Alamo Road. Visitors to the area come from a variety of locations but predominant user groups come from the Phoenix, AZ metropolitan area located about 120 miles south of the complex.

Alamo Lake State Park is located adjacent to the Palmerita Ranch allotment and includes amenities for overnight and day use. Alamo Lake State Park receives significant visitation between October and May annually, much of which impacts recreational use on adjacent public lands located within the Palmerita

Ranch allotment. The Wayside Oasis RV Park is located within the complex and draws in seasonal visitors which predominately use the adjacent public lands for OHV pursuits during the same season as Alamo Lake State Park visitors. The BLM does not currently maintain reliable visitation numbers apart from the Palmerita Ranch, a historical site with a kiosk and visitor register, which received 795 visits in fiscal year 2021 (RMIS, 2022). These points of interest combined with proximity to urban population centers in Phoenix create significant visitation to this area as observed by field staff in recent years.

OHV routes exist within the Palmerita Ranch allotment are managed under the Kingman Resource Management Plan and Final Environmental Impact Statement (BLM, 1993) and are currently opened to a variety of users, year-round without restriction. A Travel Management Plan (TMP) is currently underway that will designate these OHV routes and will provide for an open, limited, or closed designation and will work to effectively manage impacts to resources, including grazing, from OHV use. A timeframe for a decision and subsequent implementation of the TMP is estimated to take place by fiscal year 2025.

The Arizona Game and Fish Department (AGFD) administers two separate game management units within the Palmerita Ranch allotment including AGFD Unit 16A (31,431 acres), and Unit 44A (160,701 acres). Increased use occurs during these hunting seasons (predominately August through December) and would be in addition to OHV use in the area. For 2021, the AGFD recorded a total of approximately 610 hunters in Units 16A, and 44A. This total captures the whole unit, not the specific portions included in the Palmerita Ranch allotment. Therefore, it is likely that total hunting use by season is much less than the totals presented for the entire unit.

Additional uses in the area, include travelling to points of interest such as the historic Palmerita Ranch, and Arrastra Mountain Wilderness. A variety of primary, secondary, and tertiary activities as outlined above take place at these locations and are representative of dispersed recreational activities within the Palmerita Ranch allotment. As this area is located in an ERMA and currently has no TMP, there are no goals and objectives for management of this area other than to encourage dispersed recreation for visitors to have greater freedom of recreation choice with minimal regulatory constraint. Additionally, recreation sites may be identified and evaluated on a case-by-case basis which would be subject to analysis as required by NEPA and any resource conflicts with recreational use and grazing would be identified at that time.

### 2.3.9 Wild Horse and Burro

The Palmerita Ranch allotment is bordered by two Herd Management Areas (HMA) with the Big Sandy HMA situated along the northern border of above the Santa Maria River, and the Alamo HMA on the west within the boundaries of the Palmerita Ranch allotment. Wild burros are frequently observed within the Palmerita Ranch allotment, especially along the river corridor. The Alamo HMA encompasses 341,000, with an appropriate management level (AML) of 128-160 burros. The Big Sandy HMA has an AML of 111-139 burros.

## 3.0 Grazing Management

### 3.1 Mandatory Terms and Conditions for Permitted Use

The classifications and amount of permitted use for the Palmerita Ranch allotment are listed in Table 3. Permitted use is expressed in animal unit months (AUMs), the amount of forage necessary to sustain one cow-calf pair, or its equivalent, for a period of one month. Terms and conditions for grazing permits and leases must be in conformance with resource management objectives and program constraints, as identified in land use plans.

| Allotment | Allotment Number | Livestock Number | Livestock Kind | Percent Public Land | Type Use | Authorized AUMs |
|---|---|---|---|---|---|---|
| Palmerita Ranch | 00094 | 99 | Cattle | 78 | Perennial/Ephemeral | 987 |

**Table 3: Current or Most Recent** Mandatory Terms and Conditions for the Palmerita Ranch allotment

**Note:** Palmerita Ranch has had no livestock grazing since 1996. There is no permit for livestock grazing on the allotment currently. The authorized number of livestock and AUMs were taken from the last issued grazing permit for the allotment from the year 2000.

# 4.0 Objectives

## 4.1 Relevant Planning and Environmental Documents

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

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

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

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

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

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

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

## 4.2 Key Area Objectives

DPC objectives were developed for each Key Area within the allotment by an interdisciplinary team of BLM resource specialists and biologists. There are 4 active Key Areas on the Palmerita Ranch allotment. The table below shows the active Key Areas and ecological sites for each Key Area within the allotment:

| Allotment | Key Area | Ecological Site |
|---|---|---|
| **Palmerita Ranch** | PR1 | Loamy Slopes 7-10" p.z |
| | PR2 | Sandy Loam, Deep 7-10" p.z. |
| | PR3 | Limy Slopes 7-10" p.z. |
| | PR4 | Limy Fan 7-10" p.z. |

DPC objectives detail a site-specific plant community, which, when obtained, will assure rangeland health, state water quality standards, and habitat for endangered, threatened and sensitive species. Arizona Standards for Rangeland Health and DPC objectives, and the rationale for each objective, are given below.

### 4.2.1 Arizona Standards for Rangeland Health Standard 1-Upland Sites

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (Ecological Site Guide, NRCS).

Upland health is assessed by an interdisciplinary (ID) team of multiple resources using the 17 indicators from Technical Reference 1734-6 Interpreting indicators of Rangeland Health. This qualitative method uses 17 indicators to evaluate how well ecological processes are functioning based on the three attributes of soil/site stability, hydrologic function, and biotic integrity. Each indicator is evaluated by the ID team and compared to what is expected for the site. Expectations for the site are based on monitoring data (shown in Standard 3 below), NRCS Ecological Site Descriptions, NRCS Reference Sheets, weather data, and professional judgment. Indicators are rated according to their departure from the expected and when combined give the ID team an idea of how the three ecological processes are functioning and whether the site is meeting Standard 1.

If one or more of the attributes (soil/site stability, hydrologic function, and biotic integrity) exhibit a reduced functionality, then it may be determined that Standard 1 is not being met. A "preponderance of evidence" approach was used to determine the appropriate departure category for each attribute and helped to determine if Standard 1 is met. However, if the departure from expected of one indicator is of particular concern this could justify a determination that the site is not meeting Standard 1. For example, if the structural/functional

group indicator were rated at moderate to extreme because the grass component is greatly reduced or absent, this could justify a determination that the site is not meeting Standard 1.

Each indicator is evaluated by the ID team and compared to what is expected for the site. Expectations for the site are based on past monitoring data, NRCS Ecological Site Descriptions, NRCS Reference Sheets, weather data, and professional judgment. Indicators are rated according to their departure from the expected and when combined give the ID team an idea of how the three ecological processes are functioning and whether the site is meeting Standard 1.

### 4.2.2 Arizona Standards for Rangeland Health Standard 2-Riparian Sites

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

Proper functioning condition was assessed by an interdisciplinary team following the guidance in Technical Reference 1737-15 (Second Edition 2015) and 1737-16 (1999), (Revised 2003) Riparian Area Management. This qualitative method uses a series of indicators to determine if a riparian habitat and its ecological functions are intact and are capable of being sustained through drought, flooding, and current land uses.

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

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

Objectives for Standard 3 were developed by an interdisciplinary team for each key area. The team used NRCS Ecological Site Descriptions, vegetation measures for composition, cover, and frequency, and professional judgment to describe site specific plant community objectives. Threatened and endangered species and BLM sensitive species' habitat and forage requirements were considered when developing objectives. In certain instances, there was no ecological site guide written or one that matched the plant community found at a key area. In these cases, the best matching ecological site was used. If there was no "best match" then past monitoring data and professional judgment was used to develop objectives. Current monitoring data was compared to the objectives for each study to determine if an area was meeting Standard 3. Frequency data was compared to past years of long-term trend monitoring data for each site. A 95% confidence interval was used for each frequency reading to show any significant difference between frequency data collected at different periods of time at the site. Attainment of the site-specific objectives would ensure that Standard 3 is met.

- For a site to meet Standard 3, at least 75% of the following objectives must be obtained:
  a.) Objectives for site-specific desirable plant species composition met
  b.) Objectives for site-specific canopy cover is met.
  c.) The frequency of perennial grasses (or most desirable forage plant species; see Appendix A) for each site is being maintained.
  d.) Objectives for site-specific bare ground is met

<u>Key Area Specific Desired Plant Community Objectives</u>

## Palmerita Ranch Allotment

***Palmertia Ranch Key Area 1***

Key Area 1 Loamy Slopes 7-10" precipitation zone ecological site

- Maintain a vegetative canopy cover of ≥20%
- Maintain a composition of desirable forage species ≥10%
- Maintain a bare ground cover of ≤10%
- Maintain a frequency of Galleta between 2%-8%

Rationale:
This Key Area is located at an elevation of approximately 1954 feet. This site is approximately 0.5 miles north of Date Creek. The Date Creek well provides water for the area.

The rationale for DPC objectives is taken from the NRCS Loamy Slopes 7-10" p.z. reference sheet (R040XB212AZ). The reference sheet shows a canopy cover of 25-25% with a composition of 63% shrubs, 17% Forbs, and 20% perennial grasses. Maintaining or exceeding a vegetative canopy cover of 20% is appropriate for this site and is expected to provide cover for wildlife and soil site stability. The ESD indicates some usable browse and perennial grasses for livestock. The site has the potential to produce ephemeral forage in the fall, winter and spring. While somewhat lacking in cover and diversity for large mammals, this site is beneficial to a variety of small mammal, reptile and bird species. Maintaining ≥10% desirable forage species is appropriate for this site. The reference sheet calls for a bare ground cover class from 5-10%. Bare ground cover is low. Gravel content for the site is high so a bare ground cover class ≤10% for the site is appropriate. The average frequency of Galleta across all years for the site is 5%. A 95% confidence interval for this average frequency would be anywhere between 2% to 8%.

***Palmerita Ranch Key Area 2***

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

- Maintain a vegetative canopy cover of 15-25%
- Maintain a composition of desirable forage species ≥10%
- Maintain a bare ground cover of ≥40%
- Maintain a frequency of Galleta between 17-29%

Rationale:
This Key Area is located at an elevation of approximately 1704 feet. This site is approximately 2.75 miles south of the Santa Maria River.

The rationale for DPC objectives is taken from the NRCS Sandy Loam, Deep 7-10" p.z. reference sheet (R040XB221AZ). The reference sheet shows a canopy cover of 15-25% but does not break the composition down to functional groups. Maintaining or exceeding a vegetative canopy cover of 20% is appropriate for this site and is expected to provide cover for wildlife and soil site stability. The ESD indicates some usable browse and perennial grasses for livestock. This site produces very little herbaceous forage for livestock grazing. Wet winters may produce extra grazing capacity. While somewhat lacking in cover and diversity for large mammals, this site is beneficial to a variety of small mammal, reptile, and bird species. Maintaining ≥10% desirable forage species is appropriate for this site. The reference sheet calls for a bare ground cover class from 10-60%. Low values can be expected in dry years. Gravel content for the site is high so a bare ground cover class ≤10% for the site is appropriate. The average frequency of Galleta across all years for the site is 23%. A 95% confidence interval for this average frequency would be anywhere between 17% to 29%.

***Palmerita Ranch Key Area 3***

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

- Maintain a vegetative canopy cover of 5-10%
- Maintain a composition of desirable forage species ≥10%
- Maintain a bare ground cover of 10-30%
- Maintain a frequency of Galleta between 30-44%

Rationale:

This Key Area is located at an elevation of approximately 1304 feet. This site is approximately 1.15 miles south of the Santa Maria River.

The rationale for DPC objectives is taken from the NRCS Limy Slopes 7-10" p.z. reference sheet (R040XB209AZ). The reference sheet shows a canopy cover of 5-10% with a composition of 80-85% shrubs, 5-10% half-shrubs, and 5-10% succulents. Maintaining or exceeding a vegetative canopy cover of 10% is appropriate for this site and is expected to provide cover for wildlife and soil site stability. The ESD indicates some usable browse and perennial grasses for livestock. This site produces a small amount of herbaceous and shrubby forage. Perennial vegetation is available year-round. However, this site has limited potential to produce ephemeral forage following the winter rains. Site provides habitat and forage for a variety of small desert mammals, birds and reptiles, including desert tortoise. Maintaining ≥10% desirable forage species is appropriate for this site. The reference sheet calls for a bare ground cover class from 10-30%. Bare ground cover is low. Gravel content for the site is high so a bare ground cover class ≤10% for the site is appropriate. The average frequency of Galleta across all years for the site is 37%. A 95% confidence interval for this average frequency would be anywhere between 30% to 44%.

***Palmerita Ranch Key Area 4***

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

- Maintain a vegetative canopy cover of ≥10%
- Maintain a composition of desirable forage species ≥5%
- Maintain a bare ground cover of ≥40%
- Maintain a frequency of Galleta between 7-17%

Rationale:

This Key Area is located at an elevation of approximately 1794 feet. This site is approximately 1.45 miles southwest of Date Creek.

The rationale for DPC objectives is taken from the NRCS Limy Fan 7-10" p.z. reference sheet (R040XB207AZ). The reference sheet shows a canopy cover of 10-15% with a composition of 65% shrubs, 5% trees, and 30% succulents. Maintaining or exceeding a vegetative canopy cover of 10% is appropriate for this site and is expected to provide cover for wildlife and soil site stability. The ESD indicates very little browse and perennial grass forage for livestock. This site produces little to no herbaceous forage and what shrubby species are present are not palatable. Wet winters are able to produce a large amount of ephemeral forage that remains available from March-May. Cover and forage are lacking for large wildlife species, but this site is suitable for a variety of small burrowing mammals, reptiles and their predators. Maintaining ≥5% desirable forage species is appropriate for this site, as 5% is the bare minimum to justify perennial grazing. The reference sheet calls for a bare ground cover class from 10-60%. Bare ground cover is low. Gravel content for the site is high so a bare ground cover class ≤10% for the site is appropriate. The average

frequency of Galleta across all years for the site is 12%. A 95% confidence interval for this average frequency would be anywhere between 7% to 17%.

# 5.0 Monitoring Data

## 5.1 Methods

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

*Standard 2— Riparian Sites* were assessed by an interdisciplinary team following the guidance in Proper Functioning Condition Assessment for Lotic Areas (Technical Reference 1737-15 (Second Edition 2015)) and Technical Reference 1737-16 (1999), (Revised 2003) Riparian Area Management. A PFC assessment is an inventory of 17 indicators which hare categorized in to three groups of questions relating to either hydrologic, vegetative, or geomorphic features of the stream or river reach being assessed. The hydrologic indicators relate to floodplain connectivity, channel dimensions, and lateral extent of the riparian area. The vegetative indicators relate to stream and riparian function (e.g., plant age-class diversity, distribution, and vigor). The geomorphic indicators highlight the presence of erosional or depositional features found in the field and how they relate to the current state and ability of the stream to function with the supplied sediment and flow from the watershed.

Under the PFC protocol, stream reaches can be categorized as:

- Proper Functioning Condition (PFC)
- Functional—At Risk (FAR) (Trend: Upward, Downward, Not Apparent)
- Nonfunctional
- Unknown

*Standard 3 – Desired Resource Conditions* were assessed using ground cover, frequency, and species composition measurements. At each key area ground cover, pace frequency, and dry weight rank (DWR) were measured following guidance in inter agency Technical Reference 1734-4 (1996). This information is gathered at 200 points along 4 transect lines using a 40 cm x 40 cm frame. Ground cover describes the proportion of the soil surface covered by some type of protective material, which includes litter, live vegetation, rock, gravel, cryptograms, or bare ground. Vegetation cover is the percentage of ground obscured by vegetation canopy. Species composition refers to the contribution of each plant species to the vegetation community at the site. DWR was used to calculate species composition. For line intercept transects vegetation cover was used to calculate species composition. For DWR each species within a 40x40 cm frame are given a rank of 1, 2, or 3 corresponding to the amount of the current year's production. These ranks are then converted into composition. Using the following equation DWR are converted to species composition:

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

# 6.0 Management Evaluation and Summary of Studies Data

## 6.1 Actual Use

The Palmerita allotment has not been authorized for livestock grazing since 2001. Wildlife, wild burros, and potentially unauthorized livestock have been the primary sources of forage utilization on this allotment.

# 7.0 Conclusions

## 7.1 Upland Health Conclusions

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

| Allotment | Key Area | Standard 1 | Standard 3 |
|---|---|---|---|
| **Palmerita Ranch** | PR1 | Achieved | Not Achieved |
| | PR2 | Achieved | Achieved |
| | PR3 | Not Achieved | Achieved |
| | PR4 | Achieved | Not Achieved |

Upland Health Conclusions are based on the analysis of the current monitoring data for each Key Area (See Section 5.1 above).

### 7.1.1 Palmerita Ranch Allotment

*Key Area 1*
**Standard 1:** Achieved

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

Rationale:
Three of the 17 indicators were rated as more than a "none to slight" departure from expected. Overall plant production and vigor of perennial grasses and shrubs was poor on the site because of prolonged drought conditions, with extreme drought conditions during 2021 and 2022. All soil and hydrologic characteristics for the site did not department from the "none to slight" rating. Rills and other signs of erosion were present at the site in 2013. Conditions appear to be improving from previous years of degradation.

**Standard 3:** Not Achieved

Objective:

- Maintain a vegetative canopy cover of ≥20-25% ACHIEVED
- Maintain a composition of desirable forage species ≥10% ACHEIVED
- Maintain a bare ground cover of 5-10% NOT ACHEIVED

- Maintain a frequency of Galleta between 12-22% NOT ACHEIVED

Rationale:
The vegetative canopy cover objective is achieved on this site, with a vegetative canopy cover of 31%. The desirable palatable species objective is achieved with a composition of 10.22%. The Bare Ground cover class objective is not achieved on the site, with a bare ground cover class of 12.5% The Galleta frequency objective is not achieved on the site, with a frequency of Galleta of 7%.

Some use was observed at the site, mostly from burros. No livestock sign was observed which is expected as grazing is not currently permitted on this allotment.

*Key Area 2*
**Standard 1:** Achieved

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

Rationale:
Three of the 17 indicators rated as greater than "none to slight" departure from expected. The indicators that did rate greater were "slight to moderate" departures from expected. Biotic integrity was most affected at this site with reduced vigor and reproductive potential for perennial grasses and shrubs due to prolonged drought conditions. All soil and hydrologic characteristics for the site did not department from the "none to slight" rating. Extensive cryptogram coverage on site helps to stabilize these characteristics.

**Standard 3:** Achieved

Objective:
- Maintain a vegetative canopy cover of 15-25% ACHIEVED
- Maintain a composition of desirable forage species ≥10% ACHEIVED
- Maintain a bare ground cover of ≥40% ACHEIVED
- Maintain a frequency of Galleta between 17-29% NOT ACHEIVED

Rationale:
The vegetative canopy cover objective is achieved on this site, with a vegetative canopy cover of 34%. The desirable palatable species objective is achieved with a composition of 13.87%. The Bare Ground cover class objective is achieved on the site, with a bare ground cover class of 31.83% The Galleta frequency objective is not achieved on the site, with a frequency of Galleta of 8%.

Some use was observed at the site. However, there was no livestock and burro sign at the site. Livestock is not currently permitted on this allotment.

*Key Area 3*
**Standard 1:** Not Achieved

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

Rationale:
Five of 17 indicators were rated as greater than a "none to slight" departure from expected. There is a slight to moderate increase of rills at the site, possibly due to OHV use through the center of the site. The other four indicators had a moderate departure from expected for the site. Biotic factors were most affected. The plant community composition has deviated from expected values with a loss of grasses and general loss of diversity at the site. Plant vigor and reproductive potential have been reduced by prolonged periods of drought and heavy use of the site by wild burros.

**Standard 3:** Achieved

Objective:

- Maintain a vegetative canopy cover of 5-10% ACHIEVED
- Maintain a composition of desirable forage species ≥10% ACHEIVED
- Maintain a bare ground cover of 10-30% ACHEIVED
- Maintain a frequency of Galleta between 30-44% NOT ACHEIVED

Rationale:
The vegetative canopy cover objective is achieved on this site, with a vegetative canopy cover of 32%. The desirable palatable species objective is achieved with a composition of 15.18%. The Bare Ground cover class objective is achieved on the site, with a bare ground cover class of 15%. The Galleta frequency objective is not achieved on the site, with a frequency of Galleta of 11%.

There was heavy burro use and sign observed at this site. Livestock grazing is not currently permitted on this allotment.

*Key Area 4*
**Standard 1:** Achieved

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

Rationale:
Five of the 17 indicators were rated at a greater than "none to slight" departure from site expected conditions. All four indicators were rated at either "moderate" or "moderate to extreme". The concerns for the site were for the biological component of the site. Soil and hydrologic components for the site were stable. Due to drought conditions, plant vigor was very poor. Perennial grasses and woody species showed little response to the spring growing conditions. The grass component has almost disappeared from the site.

**Standard 3:** Not Achieved

- Maintain a vegetative canopy cover of 10-15% ACHIEVED
- Maintain a composition of desirable forage species ≥5% NOT ACHEIVED
- Maintain a bare ground cover of 10-40% NOT ACHEIVED
- Maintain a frequency of Galleta between 7-17% NOT ACHEIVED

Rationale:
The vegetative canopy cover objective is achieved on this site, with a vegetative canopy cover of 25%. The desirable palatable species objective is not achieved with a composition of 0.51%. The Bare Ground cover class objective is not achieved on the site, with a bare ground cover class of 43.83%. The Galleta frequency objective is not achieved on the site, with a frequency of Galleta of 1%.

Some use was observed at the site. No livestock sign was observed on the site. There was some burro sign present at the site. Livestock grazing is not currently authorized for this allotment.

## 7.2 Riparian and Wetland Conclusions

Summary of Standard Achievement or Non-achievement for all Evaluated Springs and the Santa Maria River:

| Allotment | Spring/River | Standard 2 |
|---|---|---|
| **Palmerita Ranch** | Santa Maria River | Achieved |
| | | |

### 7.2.1 Palmerita Ranch Allotment

There are no springs assessed within the boundaries of the allotment. The Santa Maria River flows through the northern end of the allotment and has been evaluated for Proper Functioning Condition (PFC) and has been determined to be in proper functioning condition. When BLM staff recorded PFC in the late 1990s, the section of the Santa Maria River that flows through the Palmerita allotment was rated as functional-at-risk. Conditions along the river appeared to have improved in the last few decades with recruitment of cottonwood trees and areas of thriving wetland vegetation.

# 8.0 Recommended Management Actions

Based on the data presented in Section 7 of this document, the Palmerita allotment is only achieving two of the three standards outlined in the Arizona Standards of Rangeland Health. Factors identified that contribute to not achieving standards include extended drought, possible historic grazing, increased OHV use and wild burros. Livestock grazing is not a contributing factor since grazing has not been authorized on the allotment since 2001. Livestock grazing should be analyzed through proper National Environmental Policy Act (NEPA) protocol for proposed permit issuance. Before livestock grazing is re-authorized on the Palmerita and a 10-year grazing permit is issued, changes in the mandatory terms and conditions are needed to reflect environmental conditions stressed by extended years of drought. These changes should pay particular attention to the decline in frequency of Big Galleta grass and the low or declining frequencies of other perennial grass species. As the dominant perennial grass in the allotment, Big Galleta provides the basis of forage that would be utilized by livestock. Consideration should be given to managing added stresses livestock could add to an already drought-stressed desirable forage species. Consideration should also be given to deferment of livestock from sensitive riparian areas and critical T&E habitat during critical growing periods to assist with production and maintenance of riparian-wetland plant communities. Terms and conditions pertaining to grazing management along the Santa Maria River should adhere to

the recommendations for threatened and endangered species and their critical habitat provided by the US Fish and Wildlife Service in the 2021 Biological Opinion. Other issues identified through internal and public scoping should be addressed and solutions incorporated into the permit to ensure that rangeland health standards continue to be met in areas where standards are currently being met and that livestock grazing is not a contributing factor to not meeting standards. Other management actions for the areas not achieving Standard 3 are recommended to be implemented prior to the permits being issued.

## 9.0 List of Preparers

| NAME | TITLE |
|---|---|
| Leah Knighton | Rangeland Management Specialist |
| Joelle Acton | Wildlife Biologist |
| Matt Driscoll | Recreation Management Specialist |
| | |

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# Appendix A – Monitoring Data

## 1.0 Key Area Data

## 1.1 Palmerita Ranch Allotment

### 1.1.1 Key Area 1

*Interpreting Indicators of Rangeland Health:* 2022

| Attribute Rating: | Rationale: |
|---|---|
| Soil and Site Stability (S): **NS** | None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure of the indicator bare ground. |
| Hydrologic Function (H): **NS** | None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure of the indicator bare ground. |
| Biotic Integrity (B): **M** | Moderate Departure. The indicator annual production and invasive plants have departed slight to moderately. The indicator functional structural groups departed moderately. The indicator perennial plant reproductive capability departed moderate to extremely. |

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

*Ground Cover Data*: 2019

| Year | Bare Ground | Veg Canopy | Litter | Gravel/Rock | Live Basal Veg | Cryptogam |
|---|---|---|---|---|---|---|
| 2022 | 12.50% | 30.67% | 8.33% | 47.83% | 0% | 0.67% |

*Frequency and Dry Weight Rank Data*: 2019

| **Plant Species TA1** | **Symbol** | **Frequency (%)** | **Composition (%)** |
|---|---|---|---|
| **Woody Species** | | **2022** | **2022** |
| *Acamptopappus sphaerocephalus* | ACSP | 4.00 | 4.62 |
| *Ambrosia dumosa* | AMDU2 | 30.00 | 30.83 |
| *Hymenoclea salsola* | HYSA | 0.50 | 0.53 |
| *Krameria grayi* | KRGR | 8.50 | 6.36 |
| *Krameria parvifolia* | KRPA | 0.50 | |
| *Larrea tridentata* | LATR2 | 18.50 | 23.94 |
| *Mammillaria* | MAMMI | 0.50 | 0.23 |
| *Parkinsonia microphylla* | PAMI5 | 3.50 | 5.61 |
| *Thamnosma montana* | THMO | 0.50 | |
| Total | | | |
| **Grasses** | | | |
| *Dasyochloa pulchella* | DAPU7 | 1.50 | 0.45 |
| *Hilaria rigida* | HIRI | 6.50 | 3.86 |

| | | | |
|---|---|---|---|
| Total | | | |
| **Forbs** | | | |
| *Eriogonum inflatum* | ERIN4 | 4.00 | 3.18 |
| *Euphorbia melanadenia* | EUME3 | 0.50 | 0.23 |
| Total | | | |
| **Annuals** | | | |
| *Annual forb(s)* | AAFF | 66.50 | 10.38 |
| *Annual grass(es)* | AAGG | 42.00 | 5.98 |
| *Erodium cicutarium* | ERCI6 | 1.00 | 1.06 |
| Total | | | |
| **Unclassified** | | | |
| *Euphorbia* | EUPHO | 9.00 | 2.73 |
| Total | | | |

### 1.1.2 Key Area 2

*Interpreting Indicators of Rangeland Health:* 2022

| Attribute Rating: | Rationale: |
|---|---|
| Soil and Site Stability (S): **NS** | None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure of the indicator bare ground. |
| Hydrologic Function (H): **NS** | None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure of the indicator bare ground. |
| Biotic Integrity (B): **SM** | Moderate Departure. The indicator annual production and invasive plants have departed slight to moderately. The indicator functional structural groups departed moderately. The indicator perennial plant reproductive capability departed moderate to extremely. |

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

*Ground Cover Data*: 2022

| Year | Bare Ground | Veg Canopy | Litter | Gravel/Rock | Live Basal Veg | Cryptogam |
|---|---|---|---|---|---|---|
| 2022 | 31.83% | 31.83% | 13.67% | 17.67% | 1.67% | 3.33% |

*Frequency and Dry Weight Rank Data*: 2022

| **Plant Species TA1** | **Symbol** | **Frequency (%)** | **Composition (%)** |
|---|---|---|---|
| **Woody Species** | | **2022** | **2022** |
| *Acamptopappus sphaerocephalus* | ACSP | 0.50 | 0.84 |
| *Ambrosia dumosa* | AMDU2 | 37.50 | 41.93 |
| *Echinocereus engelmannii* | ECEN | 0.50 | 0.08 |
| *Ferocactus acanthodes* | FEAC | 1.00 | 1.60 |
| *Hymenoclea salsola* | HYSA | 0.50 | |

| | | | |
|---|---|---|---|
| *Krameria grayi* | KRGR | 1.00 | 1.60 |
| *Larrea tridentata* | LATR2 | 25.00 | 38.32 |
| *Opuntia acanthocarpa* | OPAC | 2.50 | 3.36 |
| Total | | | |
| **Grasses** | | | |
| *Hilaria rigida* | HIRI | 8.00 | 12.27 |
| Total | | | |
| **Annuals** | | | |
| *Annual forb(s)* | AAFF | 13.50 | |
| *Annual grass(es)* | AAGG | 7.00 | |
| Total | | | |

### 1.1.3 Key Area 3

*Interpreting Indicators of Rangeland Health:* 2022

| Attribute Rating: | Rationale: |
|---|---|
| Soil and Site Stability (S): **NS** | None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure of the indicator bare ground. |
| Hydrologic Function (H): **NS** | None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure of the indicator bare ground. |
| Biotic Integrity (B): **M** | Moderate Departure. The indicator annual production and invasive plants have departed slight to moderately. The indicator functional structural groups departed moderately. The indicator perennial plant reproductive capability departed moderate to extremely. |

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

*Ground Cover Data*: 2019

| Year | Bare Ground | Veg Canopy | Litter | Gravel/Rock | Live Basal Veg | Cryptogam |
|---|---|---|---|---|---|---|
| 2022 | 15% | 31.16% | 19.17% | 28.84% | 0.83% | 5% |

*Frequency and Dry Weight Rank Data*: 2019

| **Plant Species TA1** | **Symbol** | **Frequency (%)** | **Composition (%)** |
|---|---|---|---|
| **Woody Species** | | **2022** | **2022** |
| *Acacia greggii* | ACGR | 4.00 | 3.43 |
| *Ambrosia dumosa* | AMDU2 | 2.00 | 1.26 |
| *Krameria grayi* | KRGR | 3.00 | 2.52 |
| *Larrea tridentata* | LATR2 | 34.00 | 35.66 |
| *Opuntia acanthocarpa* | OPAC | 0.50 | |
| *Psilostrophe cooperi* | PSCO2 | 0.50 | 0.49 |
| Total | | | |

| | | | |
|---|---|---|---|
| **Grasses** | | | |
| *Hilaria rigida* | HIRI | 10.50 | 12.66 |
| Total | | | |
| **Forbs** | | | |
| *Eriogonum inflatum* | ERIN4 | 4.50 | 1.82 |
| *Euphorbia melanadenia* | EUME3 | 2.00 | 1.40 |
| Total | | | |
| **Annuals** | | | |
| *Annual forb(s)* | AAFF | 71.50 | 24.34 |
| *Annual grass(es)* | AAGG | 43.00 | 14.76 |
| Total | | | |
| **Unclassified** | | | |
| *Euphorbia* | EUPHO | 6.00 | 1.68 |
| Total | | | |

### 1.1.4 Key Area 4

*Interpreting Indicators of Rangeland Health:* 2022

| Attribute Rating: | Rationale: |
|---|---|
| Soil and Site Stability (S): **NS** | None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure of the indicator bare ground. |
| Hydrologic Function (H): **NS** | None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site. With the exception of a slight to moderate departure of the indicator bare ground. |
| Biotic Integrity (B): **SM** | Moderate Departure. The indicator annual production and invasive plants have departed slight to moderately. The indicator functional structural groups departed moderately. The indicator perennial plant reproductive capability departed moderate to extremely. |

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

*Ground Cover Data*: 2019

| Year | Bare Ground | Veg Canopy | Litter | Gravel/Rock | Live Basal Veg | Cryptogam |
|---|---|---|---|---|---|---|
| 2022 | 43.83% | 24.83% | 28.50% | 0.33% | 0.17% | 2.33% |

*Frequency and Dry Weight Rank Data*: 2019

| **Plant Species TA1** | **Symbol** | **Frequency (%)** | **Composition (%)** |
|---|---|---|---|
| **Woody Species** | | **2022** | **2022** |
| *Ambrosia dumosa* | AMDU2 | 5.00 | 5.44 |
| *Cylindropuntia bigelovii* | CYBI9 | 0.50 | 0.44 |
| *Larrea tridentata* | LATR2 | 36.50 | 41.01 |
| *Opuntia acanthocarpa* | OPAC | 0.50 | 0.63 |

| | | | |
|---|---|---|---|
| Total | | | |
| **Grasses** | | | |
| *Hilaria rigida* | HIRI | 1.00 | 0.51 |
| Total | | | |
| **Annuals** | | | |
| *Annual forb(s)* | AAFF | 33.00 | 11.20 |
| *Annual grass(es)* | AAGG | 92.00 | 37.59 |
| Total | | | |
| **Unclassified** | | | |
| *Euphorbia* | EUPHO | 12.50 | 3.16 |
| Total | | | |

## 2.0 Santa Maria River South Complex Plant List

The following plant list comprises all the plant species identified on long-term monitoring transects. This list is not exhaustive nor all-inclusive of the plants on the Complex. Plant species on the list are identified by common name, scientific name, and NRCS Plants Database symbol.

| | Scientific Name | Common Name | Desirably Palatable | Palatable | No Forage Value |
|---|---|---|---|---|---|
| **Perennial Grass** | | | | | |
| **ARCAG** | **Aristida californica var. glabrata** | **Santa Rita threeawn** | | **X** | |
| **ARIST** | **Aristida sp.** | **threeawn** | | **X** | |
| **ARPUN** | **Aristida purpurea var. nealleyi** | **blue threeawn** | | **X** | |
| **DICA8** | **Digitaria californica (Trichachne californica)** | **Arizona cottontop** | **X** | | |
| **FESTU** | **Festuca sp.** | **fescue** | **X** | | |
| **HIMU2** | **Hilaria mutica** | **tobosa grass, tobosa** | | **X** | |
| **HIRI** | **Hilaria rigida** | **big galleta** | **X** | | |
| **MUPO2** | **Muhlenbergia porteri** | **bush muhly** | **X** | | |
| **STSP3** | **Stipa speciosa** | **desert needlegrass** | | **X** | |
| **TRPU10** | **Tridens pulchellus (Dasyochloa pulchella)** | **fluffgrass, low woollygrass** | | | **X** |
| **BOER4** | **Bouteloua eriopoda** | **black grama** | **X** | | |
| | | | | | |
| **Annual Grass** | | | | | |
| **ARAD** | **Aristida adscensionis** | **sixweeks threeawn** | | **X** | |
| **BOBA2** | **Bouteloua barbata** | **sixweeks grama** | | **X** | |

| | | | | | |
|---|---|---|---|---|---|
| BRRU2 | Bromus rubens | red brome, foxtail chess | | X | |
| POBI | Poa bigelovii | Bigelow's bluegrass | X | | |
| SCBA | Schismus barbatus | Mediterranean grass | | X | |
| | | | | | |
| **Perennial Forbs** | | | | | |
| ALIN | Allionia incarnata | trailing windmills, trailing four o'clock | | | X |
| ASTRA | Astragalus sp. | milkvetch, locoweed | | | X |
| BAMU | Baileya multiradiata | desert marigold | | | X |
| DICL4 | Ditaxis claryana (Argythamnia claryana) | desert silverbush | | | |
| DINE2 | Ditaxis neomexicana (Argythamnia neomexicana) | New Mexico silverbush | | | |
| ERIN4 | Eriogonum inflatum | desert trumpet | | | X |
| EUME3 | Euphorbia melanadenia | red-gland spurge | | | X |
| EUPHO | Euphorbia sp. | spurge | | | X |
| EUPO3 | Euphorbia polycarpa | smallseed sandmat | | | X |
| JAGR | Janusia gracilis | slender janusia | | | X |
| MESC | Menodora scabra (Menodora scoparia) | rough menodora | X | | |
| MILAV | Mirabilis laevis var. villosa (Mirabilis bigelovii) | wishbone bush, Bigelow's desert four o'clock | | | X |
| NIOB | Nicotiana obtusifolia | desert tobacco | | | X |
| OENOT | Oenothera sp. | evening primrose | | | X |
| SPAM2 | Sphaeralcea ambigua | desert globemallow | X | | |
| VIDE3 | Viguiera dentata | toothleaf golendeye | | | X |
| HOGL2 | Hoffmannseggia glauca | Indian rushpea | | | X |
| CAAM4 | Calchortus ambiguus | Arizona mariposa lily | | | X |
| CAEX14 | Castilleja exserta | exserted Indian paintbrush | | | X |
| DICA14 | Dichelostemma capitatum | bluedicks | X | | |
| | | | | | |
| **Annual Forbs** | | | | | |
| AMMEI2 | Amsinckia menziesii var. intermedia | common fiddleneck | | | X |
| ASNU4 | Astragalus nuttallianus | smallflowered milkvetch | | | |
| CHRI | Chorizanthe rigida | devil's spineflower | | | |
| CRYPT | Cryptantha sp. | cryptantha, catseye | | | |
| ERCI6 | Erodium cicutarium | redstem stork's bill | | X | |
| ERDI2 | Eriastrum diffusum | miniature woollystar | | | |

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|---|---|---|---|---|---|
| **ERTR8** | **Eriogonum trichopes** | **little desert trumpet** | | | |
| **LELA** | **Lepidium lasiocarpum** | **shaggyfruit pepperweed** | | | |
| **LUSP2** | **Lupinus sparsiflorus** | **Coulter's lupine** | **X** | | |
| **PEPA2** | **Pectis papposa** | **manybristle chinchweed** | | | |
| **PLOV** | **Plantago ovata** | **desert Indianwheat, blond plantain** | | **X** | |
| **PLPA2** | **Plantago patagonica** | **woolly plantain** | | **X** | |
| **SIIR** | **Sisymbrium irio** | **London rocket** | | | |
| **MATO2** | **Malacothrix torreyi** | **Torrey's desert dandelion** | | | |
| **MAPA5** | **Malva parviflora** | **cheeseweed mallow** | | | |
| | | | | | |
| **Trees, Shrubs, and Other Woody Species** | | | | | |
| **ACGR** | **Acacia greggii (Senegalia greggii)** | **catclaw acacia, wait-a-minute bush** | | **X** | |
| **ACSP** | **Acamptopappus sphaerocephalus** | **rayless goldenhead** | | | |
| **ADPO** | **Adenophyllum porophylloides (Dyssodia porophylloides)** | **San Felipe dogweed** | | | |
| **ALWR** | **Aloysia wrightii** | **Wright's beebrush** | | | |
| **AMDU** | **Ambrosia dumosa** | **burrobush, white bursage** | | **X** | |
| **AYCO** | **Ayenia compacta** | **California ayenia** | | | |
| **BRRU** | **Brickellia rusbyi** | **stinking brickellbush** | | | |
| **ENFA** | **Encelia farinosa** | **brittlebush** | | **X** | |
| **ENFR** | **Encelia frutescens** | **button brittlebush** | | **X** | |
| **EPNE** | **Ephedra nevadensis** | **mormon tea, Nevada ephedra** | **X** | | |
| **EPTR** | **Ephedra trifurca** | **longleaf jointfir, Mexican tea** | **X** | **X** | |
| **ERFA2** | **Eriogonum fasciculatum** | **California buckwheat, eastern Mojave buckwheat** | **X** | | |
| **FOSP2** | **Fouquieria splendens** | **ocotillo** | | **X** | |
| **HYSA** | **Hymenoclea salsola** | **burrobrush, cheeseweed** | | | |
| **KRER** | **Krameria erecta (Krameria parvifolia)** | **littleleaf ratany, range ratany** | **X** | **X** | |
| **KRGR** | **Krameria grayi** | **white ratany** | **X** | **X** | |
| **LATR2** | **Larrea tridentata (Larrea divaricata)** | **creosote bush** | | | |
| **LYAN** | **Lycium andersonii** | **water-jacket, Anderson's desert thorn** | | **X** | |
| **LYCIU** | **Lycium sp.** | **desert-thorn** | | | |

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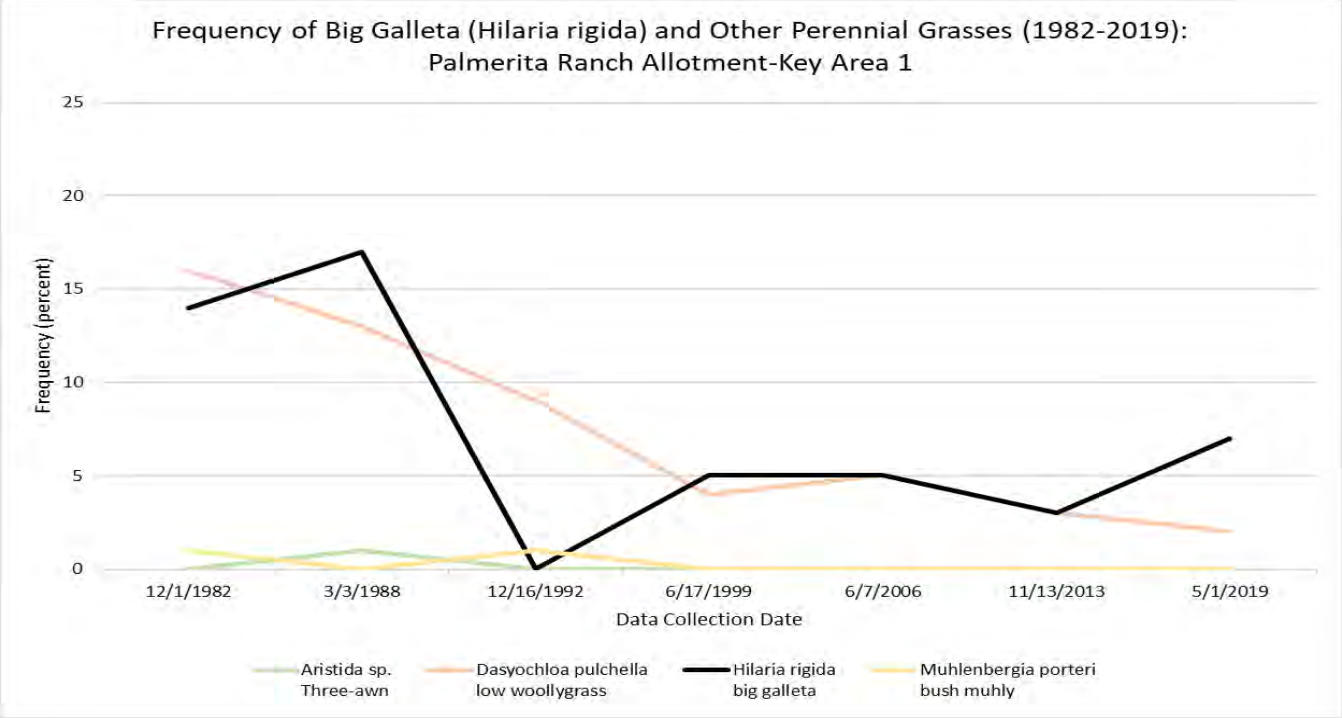
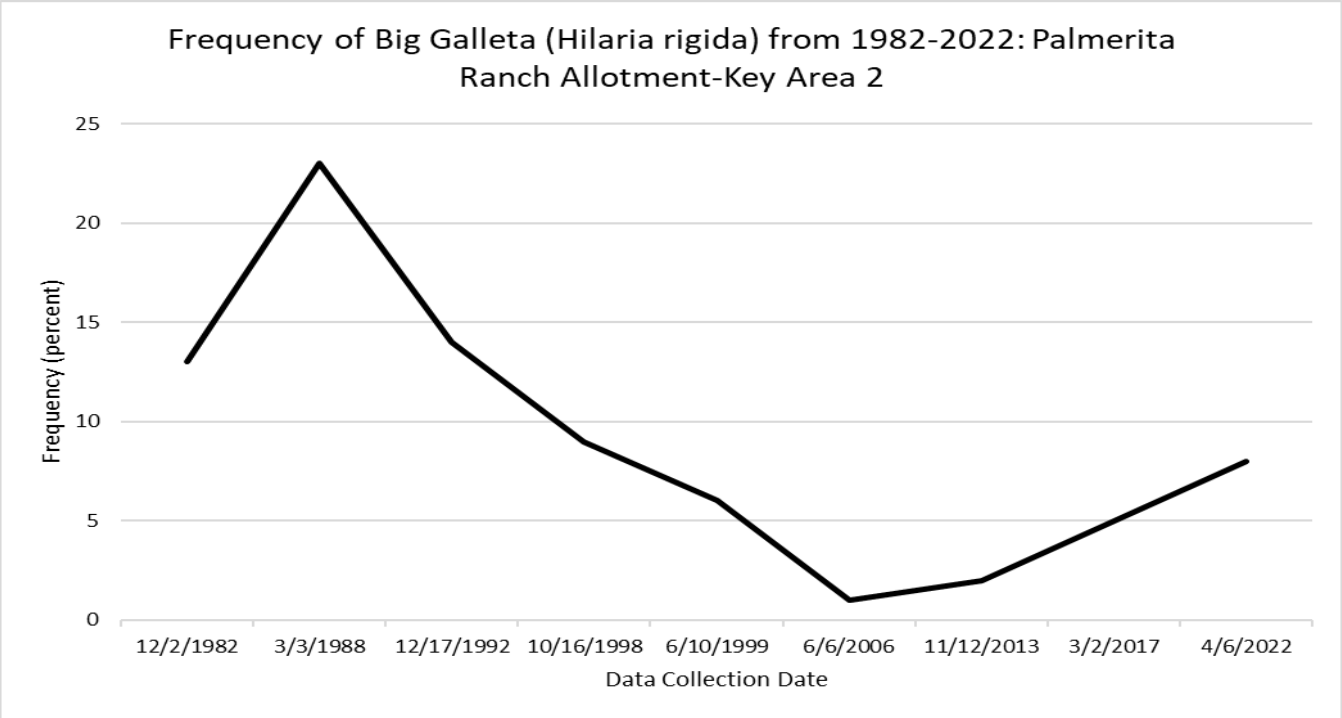
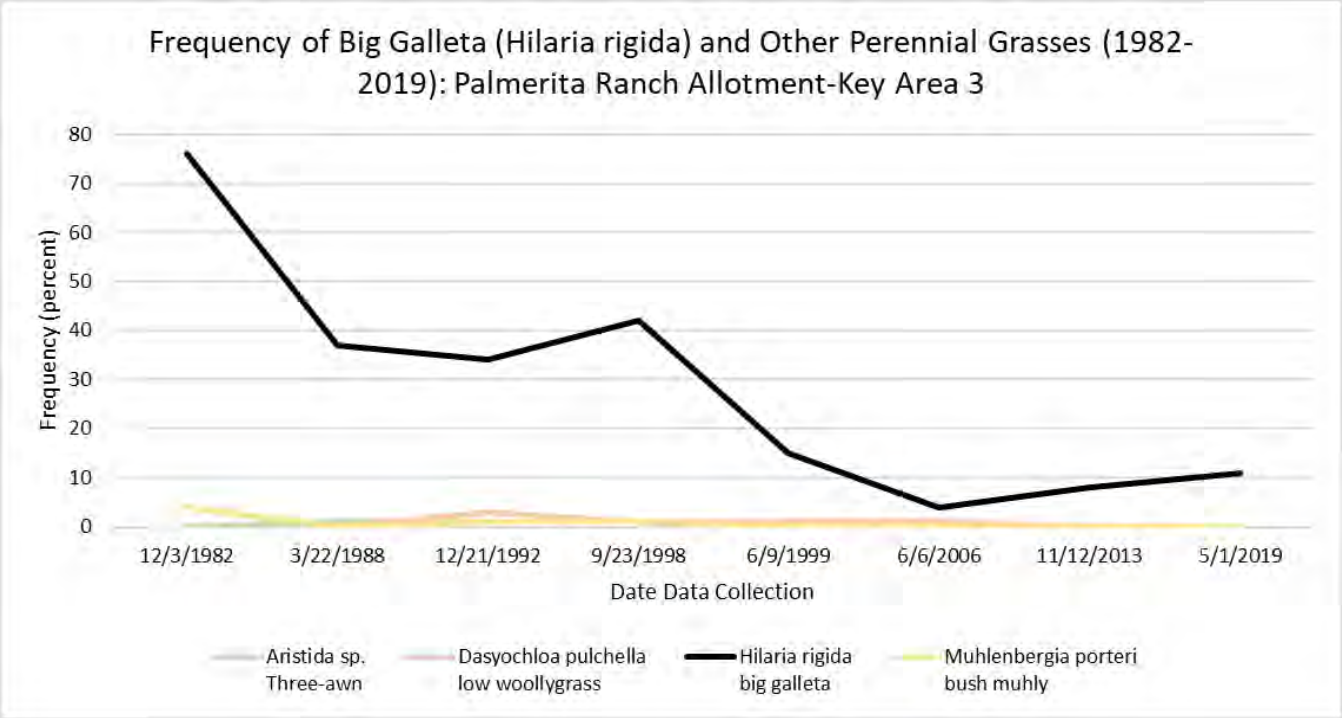
|---|---|---|---|---|---|
| **LYPA** | **Lycium pallidum** | **pale wolfberry, pale desert-thorn** | | **X** | |
| **PAMI5** | **Parkinsonia microphylla (Cercidium microphyllum)** | **yellow paloverde** | | | |
| **POGR5** | **Porophyllum gracile** | **slender poreleaf, odora** | | **X** | |
| **PRVE** | **Prosopis velutina (Prosopis juliflora)** | **velvet mesquite** | **X** | | |
| **PSCO2** | **Psilostrophe cooperi** | **whitestem paperflower, Cooper's paper daisy** | | | |
| **SAME** | **Salazaria mexicana** | **Mexican bladdersage** | | **X** | |
| **SEAR8** | **Senna armata (Cassia armata)** | **desert senna** | | | |
| **SECO10** | **Senna covesii (Cassia covesii)** | **coues' cassia** | | | |
| **STPA4** | **Stephanomeria pauciflora** | **brownplume wirelettuce** | | | |
| **THMO** | **Thamnosma montana** | **turpentine broom, Mojave desert-rue** | | **X** | |
| **VACO9** | **Vachellia constricta (Acacia constricta)** | **whitethorn acacia** | | **X** | |
| **ZIOB** | **Ziziphus obtusifolia (Condalia lycioides)** | **lotebush** | **X** | | |
| **GUSA2** | **Gutierrezia sarothrae** | **broom snakeweed** | | | **X** |
| **BABR** | **Baccharis brachyphylla** | **shortleaf baccharis, false willow** | | **X** | |
| **JUMO** | **Juniperus monosperma** | **oneseed juniper** | | **X** | |
| **PRGL2** | **Prosopis glandulosa** | **honey mesquite** | | **X** | |
| **VAFA** | **Vachellia farnesiana (Acacia farnesiana)** | **sweet acacia** | **X** | | |
| **AMER** | **Ambrosia eriocentra** | **woolly fruit burr ragweed, woolly bursage** | | | |
| **CAHO3** | **Canotia holacantha** | **crucifixion thorn** | | **X** | |
| **MIACB** | **Mimosa aculeaticarpa var. biuncifera** | **catclaw mimosa, wait-a-minute bush** | | | |
| **XYTOT** | **Xylorhiza tortifolia** | **mojave woodyaster** | | | |
| | | | | | |
| **Cacti, Chollas, Yuccas, and Succulents** | | | | | |
| **CAGI10** | **Carnegiea gigantea** | **saguaro** | | | |
| **CYAC8** | **Cylindropuntia acanthocarpa (Opuntia acanthocarpa)** | **buckhorn cholla** | | | |
| **CYEC3** | **Cylindropuntia echinocarpa (Opuntia echinocarpa)** | **Wiggins' cholla, silver cholla, golden cholla** | | **X** | |

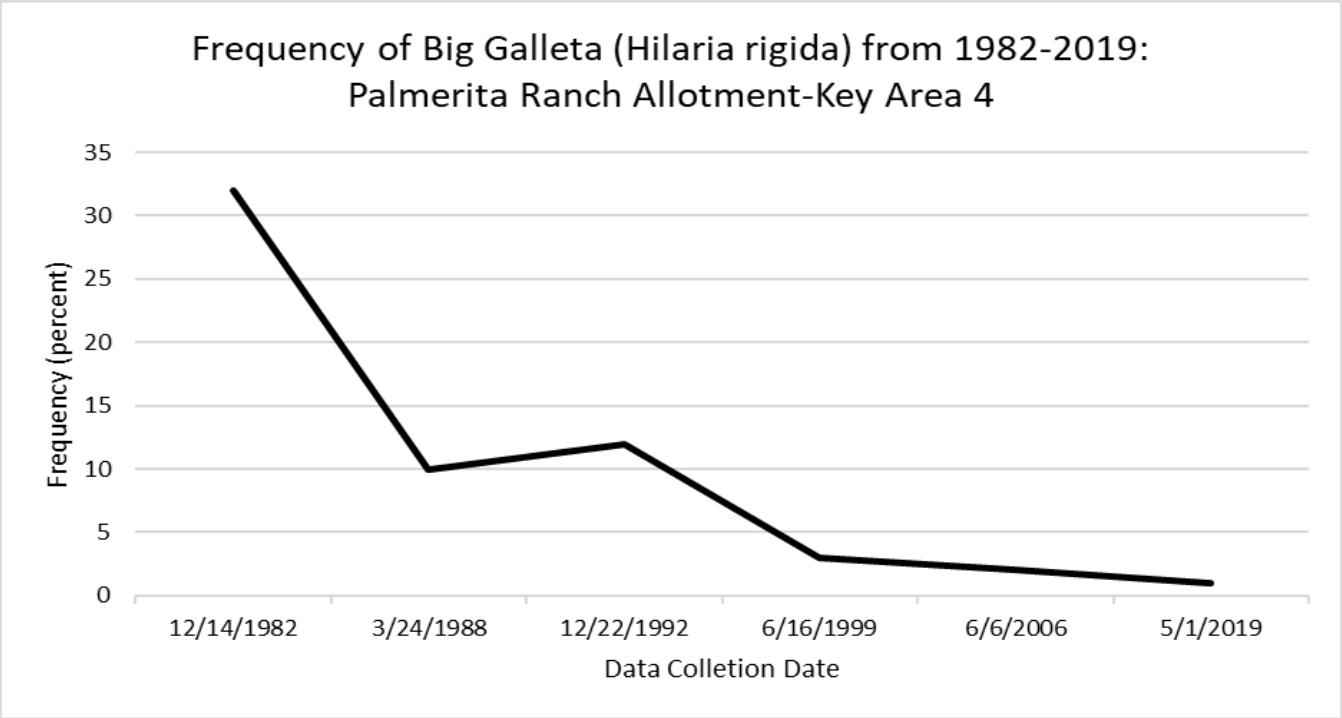
| | | | | | |
|---|---|---|---|---|---|
| **CYLE8** | **Cylindropuntia leptocaulis (Opuntia leptocaulis)** | **desert Christmas cholla** | | | |
| **ECEN** | **Echinocereus engelmannii** | **Engelmann's hedgehog cactus** | | **X** | |
| **ECTR** | **Echinocereus triglochidiatus** | **kingcup cactus/claret cup cactus** | | | |
| **FECY** | **Ferocactus cylindraceus** | **California barrel cactus** | | | |
| **FEWI** | **Ferocactus wislizeni** | **fishhook barrel cactus, Arizona barrel cactus** | | | |
| **MAMMI** | **Mammillaria sp.** | **nipple cactus, globe cactus** | | | |
| **OPBA2** | **Opuntia basilaris** | **beavertail pricklypear** | | **X** | |
| **OPCH** | **Opuntia chlorotica** | **dollarjoint pricklypear, pancake pricklypear** | **X** | | |
| **YUBA** | **Yucca baccata** | **banana yucca** | | **X** | |
| **YUBR** | **Yucca brevifolia** | **Joshua tree** | | | |
| **ECHIN3** | **Echinocereus sp.** | **hedgehog cactus** | | **X** | |
| **CYAR14** | **Cylindropuntia arbuscula (Opuntia arbuscula)** | **Arizona pencil cholla** | | | |
| **CYRA9** | **Cylindropuntia ramosissima (Opuntia ramosissima)** | **branched pencil cholla** | | | |

## 3.0 Perennial Grass Frequencies Over Time




Frequency of Big Galleta (Hilaria rigida) from 1982-2022: Palmerita Ranch Allotment-Key Area 2
Frequency (percent)
25
20
15
10
5
0
12/2/1982
3/3/1988
12/17/1992
10/16/1998
6/10/1999
6/6/2006
11/12/2013
3/2/2017
4/6/2022
Data Collection Date


Frequency of Big Galleta (Hilaria rigida) and Other Perennial Grasses (1982-2019): Palmerita Ranch Allotment-Key Area 3
Frequency (percent)
80
70
60
50
40
30
20
10
0
12/3/1982
3/22/1988
12/21/1992
9/23/1998
6/9/1999
6/6/2006
11/12/2013
5/1/2019
Date Data Collection
Aristida sp.
Three-awn
Dasyochloa pulchella
low woollygrass
Hilaria rigida
big galleta
Muhlenbergia porteri
bush muhly


Frequency of Big Galleta (Hilaria rigida) from 1982-2019:
Palmerita Ranch Allotment-Key Area 4
Frequency (percent)
35
30
25
20
15
10
5
0
12/14/1982
3/24/1988
12/22/1992
6/16/1999
6/6/2006
5/1/2019
Data Colletion Date