USDA Natural Resources Conservation Service

Ecological site R041XB219AZ
Gypsum Upland 8-12" p.z.

Last updated: 7/28/2020
Accessed: 05/13/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

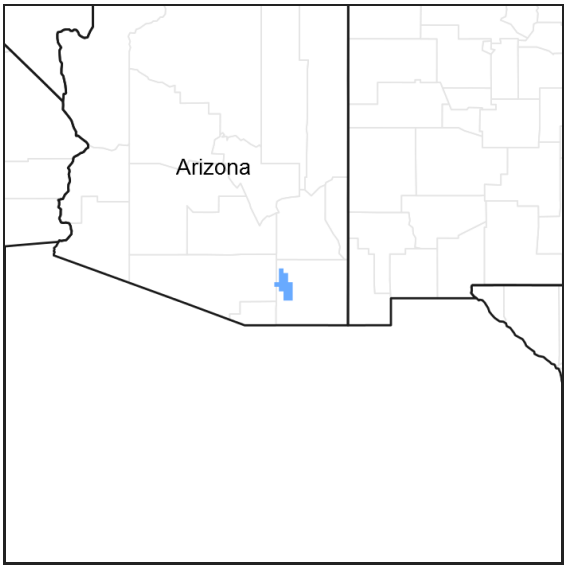


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 041X–Madrean Archipelago

AZ 41.2 – Chihuahuan – Sonoran Desert Shrubs

Elevations range from 2600 to 4000 feet and precipitation ranges from 8 to 12 inches per year. Vegetation includes mesquite, palo verde, catclaw acacia, soaptree yucca, creosotebush, whitethorn, staghorn cholla, desert saltbush, Mormon tea, burroweed, snakeweed, tobosa, black grama, threeawns, bush muhly, dropseed, and burrograss. The soil temperature regime is thermic and the soil moisture regime is typic aridic. This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

Associated sites

F041XB221AZ	**Loamy Bottom 8-12" p.z. woodland**
R041XB206AZ	**Limy Fan 8-12" p.z.**
R041XB207AZ	**Limy Slopes 8-12" p.z.**

Similar sites

R041XB201AZ	**Breaks 8-12" p.z.**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *larrea tridentata* (2) *acacia constricta*
Herbaceous	Not specified

Physiographic features

This site occurs in the lowest elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on fan terraces formed on relict lake bed sediments.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Fan remnant
Flooding frequency	None
Ponding frequency	None
Elevation	792–1,219 m
Slope	1–5%
Aspect	Aspect is not a significant factor

Climatic features

Precipitation ranges from 8-12 inches annually. More than half falls during July-Sep in brief, but often heavy, thunderstorms. The rest of the moisture comes as light rain or snow that falls slowly for a day or more, but rarely lasts more than a day. May and June are normally the driest months. Humidity is generally very low.

Temperatures are mild throughout most of the year. Freezing temperatures are common at night Dec-Feb; brief 0 F may be observed some nights. During June, July & August some days may exceed 100 F.

In years of average or greater winter precipitation, annual grasses and forbs occur abundantly in the interspaces.

Table 3. Representative climatic features

Frost-free period (average)	240 days
Freeze-free period (average)	
Precipitation total (average)	

Influencing water features

Soil features

These soils are well drained, variable in texture, stratified and high in soluble gypsum (5-30% by volume). They are moderately deep to deep and underlain by gypsum deposits in places. Coarse fragments in the soil profile are usually large gypsum crystals. These soils have formed in relict lacustrine deposits and may be slightly saline and sodic as well. They are not flooded.

Soil series mapped on this site include: SSA-666 Cochise county Northwest part MU's 14 Calcigypsids & Contention, 31 Ugyp, 32 Whitecliff; SSA-671 Cochise county Douglas-Tombstone part MU 35 Crystalgyp.

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Fine sandy loam (3) Clay
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to slow
Soil depth	152 cm
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	10.67–16.76 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

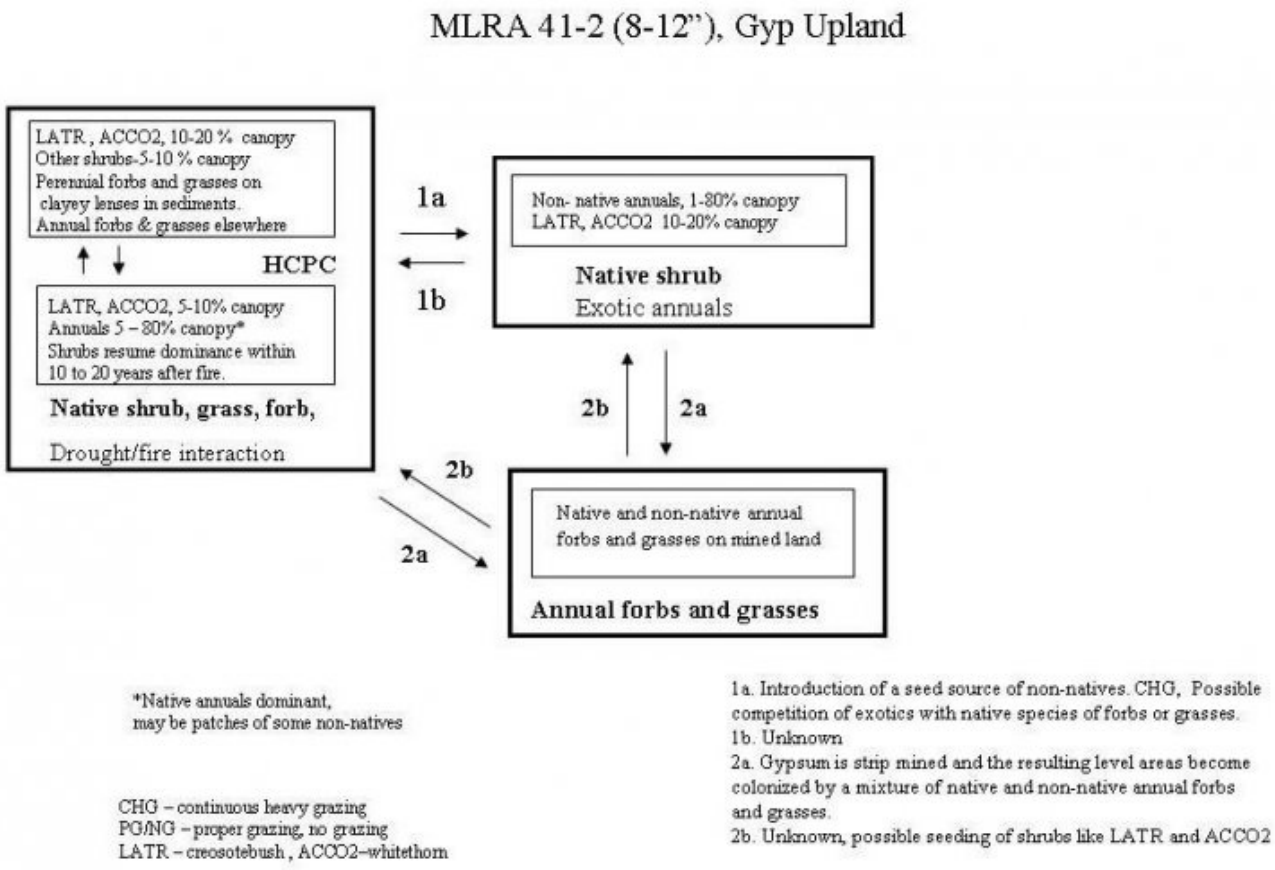
The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant community found on relict or relatively undisturbed areas of this site. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as fire, grazing and drought.

Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity index is determined by comparing the production and composition of a plant community to the production and composition described in the site description. To determine similarity index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the amount shown for that group. Divide the resulting total by the total, normal year, production shown in the plant community description. If the rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If the field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

The historic native state includes the native plant communities that occur on the site, including the historic climax plant community. This state includes other plant communities that naturally occupy the site following fire, drought, flooding, herbivores and other natural disturbances. The historic climax plant community represents the natural climax community that eventually reoccupies the site with proper management and a return to near normal conditions and/or equilibrium.

State and transition model



State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

This plant community is dominated by creosote bush with lesser amounts of other shrubs like whitethorn acacia. Annual grasses and forbs are an important part of the plant community. Cryptogams are very common on this site, often completely colonizing outcrops of gypsum. The site is extremely susceptible to soil piping and sheet, rill and gully erosion due to high concentrations of soluble gypsum in the surface soil.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	56	168	263
Grass/Grasslike	6	22	95
Forb	1	11	67
Total	**63**	**201**	**425**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0%

Biological crusts	25-50%
Litter	5-25%
Surface fragments >0.25" and <=3"	0-15%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	10-70%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-1%	0-10%	0-10%
>0.15 <= 0.3	–	0-2%	0-5%	0-10%
>0.3 <= 0.6	–	5-10%	–	0-5%
>0.6 <= 1.4	–	5-10%	–	–
>1.4 <= 4	–	0-2%	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

State 2
Shrubs, annuals

Community 2.1
Shrubs, annuals

This state occurs where the native shrub cover is still dominant but the herbaceous layer of the plant community is dominated by non-native annual forbs and grasses. These species can include filaree, red brome, mediterranean grass, Malta starthistle and Sahara mustard.

State 3
Annuals

Community 3.1
Annuals

This state occurs where strip mining for gypsum has left areas devoid of shrub cover. Native and non-native annual forbs and grasses dominate the plant community. Large chunks of gypsum crystal litter the surface. Cryptogams can quickly colonize areas of gypsum outcrop.

Transition T1A
State 1 to 2

Introduction of a seed source of non-natives, Continuous Heavy Grazing, possible competition of exotics with native species of forbs or grasses.

Transition T1B
State 1 to 3

Gypsum is strip mined and the resulting level areas become colonized by a mixture of native and non-native annual forbs and grasses.

Restoration pathway R2A
State 2 to 1

Unknown

Transition T2A
State 2 to 3

Gypsum is strip mined and the resulting level areas become colonized by a mixture of native and non-native annual forbs and grasses.

Restoration pathway R3A
State 3 to 1

Unknown

Restoration pathway R3B
State 3 to 2

Unknown

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant perennial grasses**			6–28	
	bush muhly	MUPO2	*Muhlenbergia porteri*	6–17	–
	whiplash pappusgrass	PAVA2	*Pappophorum vaginatum*	0–11	–
	spike dropseed	SPCO4	*Sporobolus contractus*	0–11	–
	false Rhodes grass	TRCR9	*Trichloris crinita*	0–11	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	0–11	–
	big sacaton	SPWR2	*Sporobolus wrightii*	0–6	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–6	–
2	**Misc. perennial grasses**			0–11	
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–6	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–6	–
	spidergrass	ARTE3	*Aristida ternipes*	0–6	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–2	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–2	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	0–2	–
	poverty threeawn	ARDI5	*Aristida divaricata*	0–2	–
	Havard's threeawn	ARHA3	*Aristida havardii*	0–1	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–1	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	0–1	–

	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–1	–
3	**Annual grasses**			0–56	
	needle grama	BOAR	*Bouteloua aristidoides*	0–22	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–22	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	0–11	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–11	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	0–6	–
	prairie threeawn	AROL	*Aristida oligantha*	0–6	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	0–6	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–2	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–2	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–2	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–2	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–2	–
	canyon cupgrass	ERLE7	*Eriochloa lemmonii*	0–2	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–2	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	0–2	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–1	–
Forb					
4	**Perennial forbs**			1–11	
	dwarf desertpeony	ACNA2	*Acourtia nana*	0–6	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	0–2	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	0–2	–
	stinging serpent	CESI	*Cevallia sinuata*	0–2	–
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–1	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–1	–
	San Pedro daisy	LAPO4	*Lasianthaea podocephala*	0–1	–
	lacy tansyaster	MAPIP4	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*	0–1	–
	desert tobacco	NIOB	*Nicotiana obtusifolia*	0–1	–
	Coues' cassia	SECO10	*Senna covesii*	0–1	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–1	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–1	–
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	0–1	–
	rue of the mountains	THTE2	*Thamnosma texana*	0–1	–
	hairyseed bahia	BAAB	*Bahia absinthifolia*	0–1	–
	desert marigold	BAMU	*Baileya multiradiata*	0–1	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–1	–
	trailing windmills	ALIN	*Allionia incarnata*	0–1	–
5	**Annual forbs**			0–56	
	combseed	PECTO	*Pectocarya*	0–11	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–11	–
	desert Indianwheat	PLOV	*Plantago ovata*	0–11	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–11	

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	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–11	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–6	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–6	–
	intermediate pepperweed	LEVIM	*Lepidium virginicum var. medium*	0–6	–
	coastal bird's-foot trefoil	LOSAB	*Lotus salsuginosus var. brevivexillus*	0–6	–
	Nuttall's povertyweed	MONU	*Monolepis nuttalliana*	0–6	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–6	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–6	–
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–6	–
	wheelscale saltbush	ATEL	*Atriplex elegans*	0–6	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–6	–
	cryptantha	CRYPT	*Cryptantha*	0–6	–
	hairy prairie clover	DAMO	*Dalea mollis*	0–2	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–2	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–2	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–2	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–2	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–2	–
	fringed redmaids	CACI2	*Calandrinia ciliata*	0–2	–
	white tackstem	CAWR	*Calycoseris wrightii*	0–2	–
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–2	–
	hyssopleaf sandmat	CHHY3	*Chamaesyce hyssopifolia*	0–2	–
	Esteve's pincushion	CHST	*Chaenactis stevioides*	0–2	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–2	–
	desert evening primrose	OEPR	*Oenothera primiveris*	0–2	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–2	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–2	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–2	–
	hairy desertsunflower	GECA2	*Geraea canescens*	0–2	–
	star gilia	GIST	*Gilia stellata*	0–2	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–2	–
	phacelia	PHACE	*Phacelia*	0–2	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	0–2	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–2	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–1	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–1	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–1	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–1	–
	Coulter's globemallow	SPCO2	*Sphaeralcea coulteri*	0–1	–
	common woolly sunflower	ERLA6	*Eriophyllum lanatum*	0–1	–

	bristly nama	NAHI	*Nama hispidum*	0–1	–
	glandular threadplant	NEGL	*Nemacladus glanduliferus*	0–1	–
	exserted Indian paintbrush	CAEXE	*Castilleja exserta ssp. exserta*	0–1	–
	yellow tackstem	CAPA7	*Calycoseris parryi*	0–1	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–1	–
	Mexican fireplant	EUHE4	*Euphorbia heterophylla*	0–1	–
	milkvetch	ASTRA	*Astragalus*	0–1	–
Shrub/Vine					
6	**Dominant shrub**			56–224	
	creosote bush	LATR2	*Larrea tridentata*	56–224	–
7	**Miscellaneous shrubs**			0–17	
	whitethorn acacia	ACCO2	*Acacia constricta*	0–11	–
	catclaw acacia	ACGR	*Acacia greggii*	0–1	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–1	–
	cattle saltbush	ATPO	*Atriplex polycarpa*	0–1	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	0–1	–
	American tarwort	FLCE	*Flourensia cernua*	0–1	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	0–1	–
	water jacket	LYAN	*Lycium andersonii*	0–1	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–1	–
	mariola	PAIN2	*Parthenium incanum*	0–1	–
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	0–1	–
	soaptree yucca	YUEL	*Yucca elata*	0–1	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–1	–
8	**Half shrubs**			0–11	
	littleleaf ratany	KRER	*Krameria erecta*	0–6	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	0–2	–
	desert zinnia	ZIAC	*Zinnia acerosa*	0–2	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–2	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–1	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	0–1	–
	burrobush	AMDU2	*Ambrosia dumosa*	0–1	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–1	–
9	**Succulents**			0–11	
	devil's cholla	GRKU	*Grusonia kunzei*	0–3	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	0–2	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–2	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–1	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–1	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–1	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–1	–
	nightblooming cereus	PEGR3	*Peniocereus greggii*	0–1	–

	cactus apple	OPEN3	*Opuntia engelmannii*	0–1	–

Animal community

This site offers little in the way of livestock forage. It does produce limited forage of annual grasses and forbs in wet winters. High amounts of soluble gypsum in runoff water that is collected in stock ponds may have a laxative effect on livestock.
Wildlife on the site is limited to small mammals and birds and their associated predators.

Hydrological functions

Medium to heavy textured soils make this a moderate producer of runoff. Soluble gypsum can lead to piping and rilling with heavy rainfall.

Recreational uses

Hunting, horseback riding, hiking, four wheeling.

Other products

Gypsum is mined in many areas for material used in making sheet rock.

Type locality

Location 1: Cochise County, AZ	
Township/Range/Section	T17S R20E S1
General legal description	San Pedro Ranch estates.

Contributors

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Approval

Scott Woodall, 7/28/2020

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/13/2025
Approved by	Scott Woodall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**