USDA Natural Resources
Conservation Service

Ecological site DX035X03A112
Loamy

Accessed: 05/16/2024

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.

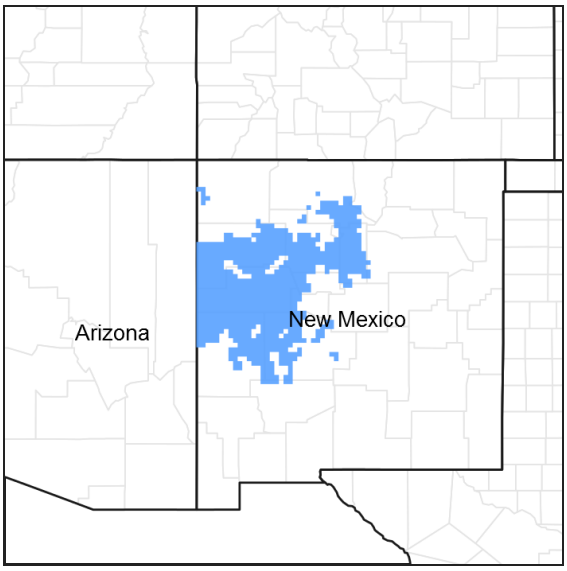


Figure 1. Mapped extent

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Krascheninnikovia lanata*
Herbaceous	(1) *Bouteloua gracilis* (2) *Pascopyrum smithii*

Legacy ID

R035XA112NM

Physiographic features

This site occurs on level to sometimes strongly sloping piedmont slopes or plains. Average slopes are 5 percent or less, although slopes may range as high as 15 percent. Elevations vary from about 6,000 to 7,300 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Plain (3) Fan remnant
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	1,829–2,225 m
Slope	0–15%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation varies from about 10 inches to just over 16 inches. Fluctuations ranging from about 5 inches to 25 inches are not uncommon. The overall climate is characterized by cold dry winters in which winter moisture is less than summer. As much as half or more of the annual precipitation can be expected to come during the period of July through September. Thus, fall conditions are often more favorable for good growth of cool-season perennial grasses, shrubs, and forbs than are those of spring.

The average frost-free season is about 120 days and extends from approximately mid May too early or mid September. Average annual air temperatures are 50 degrees F or lower and summer maximums rarely exceed 100 degrees F. Winter minimums typically approach or go below zero. Monthly mean temperatures exceed 70 degrees F for the period of July and August.

Rainfall patterns generally favor warm-season perennial vegetation, while the temperature regime tends to favor cool-season vegetation. This creates a somewhat complex community of plants on any given ecological site, which is quite susceptible to disturbance and is at or near its productive potential only when both the natural warm/cool-season dominants are present.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site using 50% probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

Table 3. Representative climatic features

Frost-free period (average)	148 days
Freeze-free period (average)	174 days
Precipitation total (average)	406 mm

Influencing water features

This site is not influenced by water from a wetland or stream.

Soil features

Typical soils are moderately deep to very deep and well drained. The surface layer is medium textured loams, fine sandy loams, and very fine sandy loams. Surface and underlying textures may contain gravels but generally contains less than 35 percent. Underlying layers vary from moderately coarse to fine textured. The water-holding capacity is moderately high to high, and permeability is moderately slow to moderate. As vegetation cover deteriorates, however, intake rates may be reduced to slow.

Table 4. Representative soil features

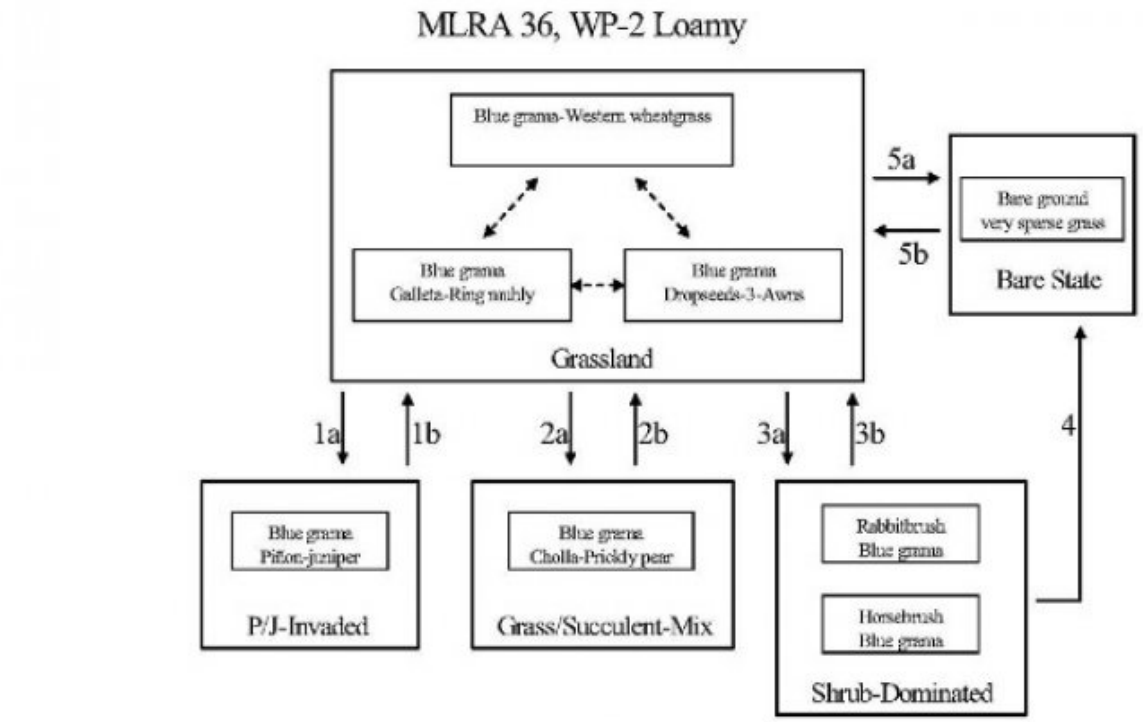
Surface texture	(1) Gravelly loam (2) Fine sandy loam (3) Sandy loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	51–183 cm
Surface fragment cover <=3"	5–35%
Surface fragment cover >3"	0–35%
Available water capacity (0-101.6cm)	15.24–30.48 cm
Calcium carbonate equivalent (0-101.6cm)	0–25%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	0–35%
Subsurface fragment volume >3" (Depth not specified)	0–35%

Ecological dynamics

Overview
The Loamy site is one of the broadest ecological sites in WP-2 encompassing a wide range of soil series. It is associated with Sandy, Shallow Sandstone, Malpais, Limy, Shallow, Swale, and Savannah sites. Loamy sites occur as distinct units adjacent to or as part of complex or association with soil map units correlated to the above sites. The historic plant community of the Loamy site is a grassland characterized by a mixture of cool and warm-season grasses, and occasional shrubs and forbs. Blue grama and western wheatgrass are the dominant grasses. Fourwing saltbush and winterfat are characteristic shrubs. Loss of herbaceous cover and resulting decreased competition by grasses may favor piñon/juniper invasion or the encroachment of shrubs, typically, rabbitbrush or horsebrush. Seed dispersal and the reduction of natural fire frequency may also contribute to the invasion of piñon/juniper. Decreased available soil moisture due to drought and overgrazing, seed dispersal, and decreased fire frequency may promote the transition to a Grass/Succulent state. A severe loss of herbaceous cover, soil sealing, and reduced infiltration may cause the transition to a Bare state. While Piñon/Juniper-Invaded, Grass Succulent-Mix, and Shrub-Dominated may result from similar transitional drivers, it is unclear what factor or combination of factors ultimately determine the transition pathway.

State and transition model

Plant Communities and Transitional Pathways (diagram)



1a. Loss of grass cover, resource competition, seed dispersal, lack of fire. 1b. Brush control, prescribed fire, prescribed grazing.

2a. Drought, overgrazing, dispersal of succulent propagules, lack of fire. 2b. Brush control, prescribed grazing, prescribed fire.

3a. Loss of grass cover, resource competition. 3b. Brush control, prescribed grazing, seeding?

4. Brush control without grass recovery.

5a.Severe loss of grass cover, soil sealing and decreased infiltration, erosion. 5b.Break up physical soil crusts, range seeding, prescribed grazing.

Figure 4. Loamy WP-2 036B State and Transition Diagram

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

State Containing Historic Climax Plant Community Grassland: Blue grama and western wheatgrass are the primary grass species of the historic plant community. Other grasses that appear in significant amounts include spike muhly, bottlebrush squirreltail, New Mexico feathergrass, needle and thread, sideoats grama and galleta. Fourwing saltbush and winterfat are characteristic shrubs. Continuous heavy grazing typically causes a decrease in western wheatgrass, sideoats grama, spike muhly, winterfat, and fourwing saltbush. This is followed by an increase of blue grama, galleta, dropseeds, ring muhly, and threeawns. On heavier textured soils a community dominated by blue grama with galleta and ring muhly as sub-dominants may result. On lighter textured soils, dropseeds and threeawns may be sub-dominant to blue grama. Diagnosis: Grass and litter cover is evenly distributed with few large bare areas present. Shrubs are a minor component averaging six percent or less canopy cover. Evidence of erosion is minimal.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	594	852
Forb	34	59	85
Total	**370**	**653**	**937**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	0%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	10-20%
Surface fragments >0.25" and <=3"	0-35%
Surface fragments >3"	0-35%
Bedrock	0%
Water	0%
Bare ground	45-55%

Figure 6. Plant community growth curve (percent production by month). NM0303, R035XA112NM-Loamy-HCPC. Mixed warm/cool-season grassland w/shrub and half-shrub and forb component..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	25	25	8	5	0	0

State 2
Pinon/Juniper-Invaded

Community 2.1
Pinon/Juniper-Invaded

Catalog of states and community pathways Additional States: Piñon/Juniper-Invaded: This state is characterized by the presence of piñon or juniper and decreased cover and production of grasses. Grass cover decreases as piñon/juniper canopy increases. Blue grama is the dominant grass, usually with ring muhly, galleta, threeawns, and dropseeds as sub-dominants. Diagnosis: Piñon and or juniper are present. Blue grama is the dominant grass. Grass cover is variable ranging from fairly uniform to patchy with large bare areas present. Evidence of erosion such as elongated waterflow patterns, pedestalling of plants, and rills may be common. Transition to Piñon/Juniper-Invaded (1a) Loss of grass cover, the associated decreased competition by grasses, seed dispersal, and lack of fire are believed to facilitate the encroachment of piñon/juniper.1,2,3,7 Loss of herbaceous cover due to overgrazing and drought can provide competition free areas for piñon/juniper seedling establishment, and afford a competitive advantage to established woody species. Dispersal of piñon and juniper seed by wildlife and livestock may contribute to the probability of piñon/juniper invasion.2, 4,5 Sites in close proximity to established piñon/juniper woodlands might also be at greater risk of invasion. Historically, periodic fire may have helped to suppress piñon/juniper by killing seedlings and some established trees, and by increasing the susceptibility in others to damage by insects, disease, and drought. Key indicators of approach to transition: * Decrease in western wheatgrass, sideoats grama, and winterfat. * Increase in amount and patch size of bare ground. * Presence of piñon/juniper seedlings. Transition back to Grassland (1b) Brush control is necessary to reduce the competitive influence of piñon/juniper and facilitate grass recovery. Prescribed fire may be useful in restoring grass dominance, provided adequate fine fuels remain to effectively carry fire. Prescribed grazing will help ensure adequate rest

following brush control and will assist in the establishment and maintenance of grass cover.

State 3
Grass/Succulent-Mix

Community 3.1
Grass/Succulent-Mix

Grass/Succulent-Mix: This state is characterized by an increase in cholla and pricklypear. Increased densities of cholla or pricklypear is recognized as a management concern, but their impact on grass production is unclear.6 Light to medium cholla or prickly pear infestation do not seem to greatly reduce grass production, however it restricts grazing access and interferes with livestock movement and handling. Blue grama is typically the dominant grass. Threeawns, galleta, ring muhly, and dropseeds are subordinates. Diagnosis: Cholla and prickly pear are found at increased densities. Grass cover is variable ranging from fairly uniform to patchy with frequent areas of bare ground present. Blue grama is the dominant grass. Transition to Grass/Succulent-Mix (2a) Decreased available soil moisture due to drought and overgrazing may initiate this transition. During severe drought perennial grass cover can decline significantly, leaving resources available for use by more drought tolerant succulents. Cholla and pricklypear are both adapted to and favored by limited soil moisture due to the ability of their shallow, wide spreading root systems to absorb and store water.8 Wildlife and livestock may act as dispersal agents for succulents. Fruits and seeds may be spread by wildlife species that feed on succulents. Wildlife and livestock can dislodge and transport sprouting stems and pads of cholla and pricklypear. It has been reported that succulent densities may be higher on areas historically grazed by high numbers of sheep. If fire historically played a part in suppressing seedlings of succulents on this site, then reduced fire frequency may favor the increase of succulents. Key indicators of approach to transition: *Increase in the size and number of bare patches. *Increase in amount of succulent seedlings. Transition back to Grassland (2b) Fire is and effective means of controlling cholla and prickly pear if adequate grass cover remains to carry fire. Cholla greater than two feet tall or pricklypear with a large amount of pads (>15-20) are harder to kill. Chemical control is effective in controlling prickly pear and cholla; apply when growth starts in May. Hand grubbing is also effective if cholla or pricklypear is severed 2-4 inches below ground and care is taken not to let broken joints or pads take root. Stacking and burning piles and grubbing during winter or drought help keeps broken joints and pads from rooting. Prescribed grazing will help ensure proper forage utilization and sustain grass cover.

State 4
Shrub-Dominated

Community 4.1
Shrub-Dominated

Shrub-Dominated: The state is characterized by the predominance of shrubs, especially rabbitbrush and or horsebrush. Rabbitbrush is favored on soils with finer textured (heavy clay loam and clay) sub-surface horizons. The grass component is typically a low-vigor blue grama dominated community with ring muhly, threeawns, and dropseeds occurring as subordinates. Diagnosis: Rabbitbrush, and/or horsebrush are the dominant shrubs. Blue grama is the dominant grass and cool season grasses are sparse or absent. Grass cover is patchy to sparse with large interconnected bare areas present. Evidence of erosion such as pedestals, terracettes, and rills may be common. Transition to Shrub-Dominated (3a) Loss of herbaceous cover due to overgrazing and/or extended drought and the associated decreased resource competition by grasses may facilitate the transition to the Shrub-Dominated state. Key indicators of approach to transition: * Decreased grass and litter cover. * Increased bare patch size. * Increased rabbitbrush or horsebrush seedlings. Transition back to Grassland (3b) Brush control will be necessary to remove shrubs and eliminate competition for resources necessary for grass establishment or reproduction. Seeding may be necessary on those sites where desired grass species are absent or limited. Prescribed grazing will help ensure adequate time is elapsed before grazing is allowed, and proper forage utilization following seeding establishment

State 5
Bare State

Community 5.1
Bare State

Bare State: Extensive bare areas, minimal grass cover, physical soil crusts, and erosion characterize this state. Physical crusts may be more pervasive on silt loam soils. Grass cover is extremely sparse, consisting of small isolated patches or individual plants. A few widely scattered shrubs or succulents may be present. Diagnosis: Bare ground is dominant and grasses cover is very sparse. Physical soil crusts are widespread. Transition to Bare State (4) Brush control without successful recovery of grasses may result in a Bare state. Transition to Bare State (5a) Continuous heavy grazing, or other repeated disturbance that severely depletes grass cover could initiate this transition. The loss of grass and litter cover causes a decrease in organic matter, soil aggregate stability, and infiltration. This further promotes the formation of physical soil crusts, impedes seedling establishment, and increases runoff and erosion. Key indicators of approach to transition: * Continued reduction in grass cover. * Reduced aggregate stability in bare areas * Increased soil surface sealing and increased evidence of erosion. Transition back to Grassland (5b) Seeding will be necessary to reestablish grasses. The use of livestock or mechanical means may be useful in breaking up physical soil crusts and improving infiltration prior to seeding. Prescribed grazing will help to ensure dequate rest and proper forage utilization following seeding. The degree to which this site is capable of recovery depends on the extent of degradation to the soil resources and adequate rainfall necessary to establish and maintain grasses.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				149–186	
	blue grama	BOGR2	*Bouteloua gracilis*	149–186	–
2				74–149	
	western wheatgrass	PASM	*Pascopyrum smithii*	74–149	–
3				59–90	
	spike muhly	MUWR	*Muhlenbergia wrightii*	59–90	–
4				37–74	
	squirreltail	ELEL5	*Elymus elymoides*	37–74	–
5				37–74	
	needle and thread	HECO26	*Hesperostipa comata*	37–74	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	37–74	–
6				8–37	
	James' galleta	PLJA	*Pleuraphis jamesii*	8–37	–
7				8–37	
	sideoats grama	BOCU	*Bouteloua curtipendula*	8–37	–
8				8–37	
	common wolfstail	LYPH	*Lycurus phleoides*	8–37	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	8–37	–
9				8–37	
	threeawn	ARIST	*Aristida*	8–37	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	8–37	–
10				8–22	
	black grama	BOER4	*Bouteloua eriopoda*	8–22	–
11				8–37	

	alkali sacaton	SPAI	*Sporobolus airoides*	8–37	–
Forb					
12				8–59	
	Forb, perennial	2FP	*Forb, perennial*	8–59	–
13				8–37	
	Forb, annual	2FA	*Forb, annual*	8–37	–
Shrub/Vine					
14				8–37	
	fourwing saltbush	ATCA2	*Atriplex canescens*	8–37	–
15				8–37	
	winterfat	KRLA2	*Krascheninnikovia lanata*	8–37	–
16				8–37	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	8–37	–
	prairie sagewort	ARFR4	*Artemisia frigida*	8–37	–
17				8–22	
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	8–22	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	8–22	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	8–22	–
18				8–22	
	Apache plume	FAPA	*Fallugia paradoxa*	8–22	–
	pale desert-thorn	LYPA	*Lycium pallidum*	8–22	–

Animal community

Habitat for Wildlife:
This site provides habitat which support a resident animal community that is characterized by pronghorn antelope, black-tailed jackrabbit, badger, Gunnison’s prairie dog, banner-tailed kangaroo rat, Botta’s pocket gopher, silky pocket mouse, burrowing owl, mourning dove, chipping sparrow, western spadefoot toad, leopard lizard, short-horned lizard, and prairie rattlesnake.

The chestnut-collared longspur winters on this site, and the common raven and prairie falcon hunt over it.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series----------Hydrologic Group
Aquima----------B
Augustine----------B
Celacy----------C
Celsosprings----------C
Clovis----------B
Datil----------B
Dioxice----------B
Doakum----------B
El Rancho----------B
Flaco----------C
Flugle----------B

Galestina----------C
Gilco----------B
Goesling----------B
Grieta----------B
Guy----------B
Hagerman----------C & B
Jacee----------C
Jocity----------B
Khapo----------B
Kim----------B
La Fonda----------B
Landavaso----------B
Las Lucas----------B
Loarc----------B
Maia----------B
Manzano----------B
Marianolake----------B
Mikim----------B
Millpaw----------C & D
Oelop----------B
Paguate----------C
Panky----------B
Penistaja----------B
Querencia----------B
Redpen----------B
Scholle----------B
Shavano----------B
Silver----------C
Tapia----------B
Teczuni----------C
Tejana----------B
Veteado----------C
Witt----------B
Zepol----------B
Zia----------B

Recreational uses

This site offers fair to good potential for hiking, horseback riding, nature observation, photography, and hunting for pronghorn antelope. Very limited hunting opportunities for quail and dove usually exist. During seasons when soil moisture is favorable, the site may display a colorful array of wildflowers.

Wood products

This site has no significant value for wood products.

Other products

Grazing:
This site is suitable for grazing by cattle, sheep, and horses in all seasons of the year, but is poorly suited to continuous year long use if potential natural vegetation is to be maintained. Under such use, cool-season grasses such as western wheatgrass may decline rapidly. If use is heavy and prolonged, such species as sideoats grama and spike muhly will also decline.

Typical site deterioration is characterized by low-vigor, sod-like blue grama, which may eventually come to make up 80 to 95 percent of the composition. Further deterioration is characterized by increasing amounts of bare ground,

possible invasion by woody plants, such as pinyon and juniper, and increases in ring muhly, threeawn spp., and sand dropseed. The site is also susceptible to takeover by rabbitbrush. Production in these instances may be cut to onethird or even one- fourth of the potential.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index----------Ac/AUM
100 - 76----------3.3 – 4.6
75 – 51----------4.4 – 6.8
50 – 26----------6.5 – 11.0
25 – 0----------11.0+

Type locality

Location 1: Catron County, NM
Location 2: Socorro County, NM

Other references

Data collection for this site was done in conjunction with the progressive soil surveys within the New Mexico and Arizona Plateaus and Mesas 36 Major Land Resource Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: McKinley, Cibola, Sandoval, Catron, Socorro.

1. Brockway, D.G., R.G. Gatewood, and R.B. Paris. 2002. Restoring grassland savannas from degraded pinyon-juniper woodlands: effects of mechanical overstory reduction and slash treatment alternatives. Journal of Environmental Management. 64: 179-197.

2. Johnsen, T. N., Jr. 1962. One-seeded juniper invasion of northern Arizona grasslands. Ecological Monographs. 32:187-207.

3. Miller, R.F., and R.J. Tausch. 2001. The role of fire in pinyon and juniper woodlands: a descriptive analysis. Pages 15–30 in K.E.M. Galley and T.P. Wilson (eds.). Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, FL.

4. Parker, K. W. 1945. Juniper comes to the grassland. American Cattle Producer. 27: 12-14.

5. Phillips, Frank J. 1910. The dissemination of junipers by birds. Forestry Quarterly. 8: 60-73. (From Expt. Sta. Rec. 22: 644.)

6. Pieper, R.D. 1971. Blue grama vegetation responds inconsistently to cholla cactus control. Journal of Range Management. 24: 52- 54.

7. Richardson, D.M. and W.J. Bond. 1991. Determinants of plant distribution: Evidence from pine invasions. The American Naturalist. 137: 639-668

8. Vallentine, J.F. 1989. Range Developments and Improvements. 3rd Edition. Academic Press. San Diego, California
Characteristic Soils Are: Datil and Dioxice

Other Soils included are:
Aquima, Augustine, Bond, Celacy Celsosprings, Clovis, Doakum, El Rancho, Flaco, Flugle, Galestina, Gilco, Goesling, Grieta, Guy Hagerman, Jacee, Jocity, Kim, La Fonda Landavaso, Las Lucas, Loarc, Maia, Manzano Marianolake, Mikim, Millpaw, Oelop, Paguate Penistaja, Querencia, Redpen, Scholle, Shavano Silver, Tapia,

Teczuni, Tejana, Veteado, Witt, Zia

Contributors

Christine Bishop
David Trujillo
Don Sylvester
John Tunberg

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	
Approved by	
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):**

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

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

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

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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:

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**
