USDA Natural Resources
Conservation Service

Ecological site R042CY156NM
Gravelly

Last updated: 10/21/2024
Accessed: 11/13/2024

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.

Ecological site concept

This site occurs on upland plains, fans, mesas, and drainageways. Slopes range from 0 to 6 percent.
The soils of this site are deep to moderately deep and well drained. Surface textures are gravelly loams and gravelly fine sandy loams. Because of relatively high fragment content throughout the profile, water holding capacity is low.

Associated sites

R042CY151NM	**Limestone Hills** Limestone Hills occurs on limestone hills and footslopes of higher mountains. Slopes range from 10 to 60 percent. Soils are shallow, gravelly, and loamy. The reference plant community is mixed prairie grassland with scattered shrubs, forbs, and trees.
R042CY152NM	**Shallow** Shallow occurs on gravelly alluvial fans of higher limestone mountains. Slopes range from 5 to 20 percent. Soils are loamy, gravelly, and very shallow to a petrocalcic horizon also known as a root restricting layer. The reference plant community is mixed prairie grassland with scattered shrubs, trees, and forbs.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Juniperus pinchotii*
Herbaceous	(1) *Bouteloua gracilis* (2) *Bouteloua curtipendula*

Physiographic features

This site occurs on upland plains, fans, mesas, and drainageways. Slopes range from 0 to 6 percent. Direction of slope varies but is not significant. Elevations range from 4,000 to 7,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Alluvial fan (3) Mesa
Flooding frequency	None

Ponding frequency	None
Elevation	4,000–7,000 ft
Slope	0–6%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this area is “semi-arid continental.”

Annual average precipitation ranges from 11 to 19 inches. Variations of 5 inches, more or less, are not uncommon. Approximately 70 percent of this occurs from May through October. Most of this summer precipitation comes in the form of high-intensity, short- duration thunderstorms. Winter moisture is usually negligible.

Temperatures are characterized by distinct seasonal changes and large annual diurnal temperature changes. The average annual temperature ranges from 55 degrees F to 60 degrees F, with extremes of 20 degrees F below zero in the winter to 110 degrees F in the summer not uncommon.

The average frost-free season is 170 to 189 days. The last killing frost is in early April and the first killing frost is in mid October.

Both temperature and moisture favor warm-season plant growth. Due to gravel in the soil profile, the water intake is fast and penetration is deep. Because the soil has a low water holding capacity, plants of this site must be able to take advantage of rain when it falls. Strong winds from the west and southwest blow from February through June. This accelerates soil drying within the root zone and further discourages cool season plant growth.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site.
Data interpreted utilizing NM NRCS Climate Summarizer spreadsheet.

Table 3. Representative climatic features

Frost-free period (average)	189 days
Freeze-free period (average)	211 days
Precipitation total (average)	19 in

Influencing water features

This is an upland site, and is not associated with water features or wetlands. During heavy rain events, this site may receive run-on or throughflow moisture from landforms above and contribute runoff or throughflow to landforms below.

Soil features

The soils of this site are deep to moderately deep and well drained. Surface textures are gravelly loams and gravelly fine sandy loams. Permeability is moderate to moderately rapid and water holding capacity is low. Because the soils are well drained and have a low water holding capacity, this site has a droughty appearance. Plant roots can be deep on shrub species.

Characteristic soils: Pinery soil series

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Gravelly loam (2) Very gravelly loam

Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow
Soil depth	72 in
Surface fragment cover <=3"	10–20%
Surface fragment cover >3"	5–15%
Available water capacity (0-40in)	2–4 in
Calcium carbonate equivalent (0-40in)	10–25%
Electrical conductivity (0-40in)	0–1 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	20%
Subsurface fragment volume >3" (Depth not specified)	12–14%

Ecological dynamics

The reference plant community of the Gravelly site is a grassland/shrub-mix, dominated by grasses, with scattered shrubs and few trees. Dispersal of shrub seeds, competition for resources, loss of grass cover, and a decrease in natural fire regimes may facilitate the encroachment of shrubs. There is no evidence of a state where grasses are completely lost, perhaps due to low erodibility of high gravel soils and sufficient resources to support grass-shrub coexistence. A nonnative state is recognized where a few nonnative plants have been introduced.

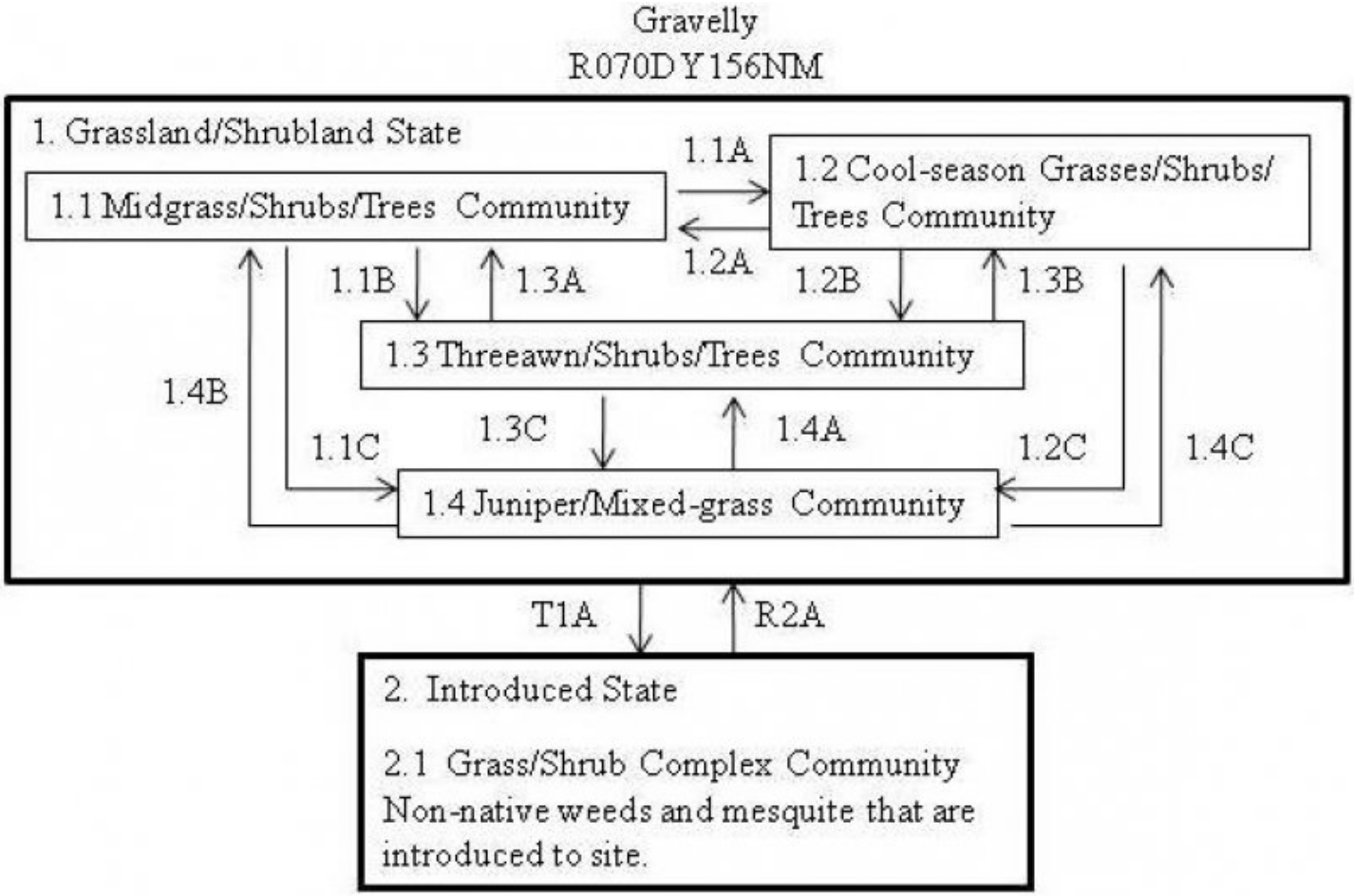
Fire plays an important role in maintaining the reference plant community. A fire frequency of 10-15 years would make this community type grassier (Ahlstrand 1982). However, Paysen et al. (2000) cautions that while fire can be used to accomplish objectives in grassy desert shrublands, it may also contribute to loss of desirable species. At Guadalupe Mountains National, pinyon pine is a minor component of this site, however frequent prescribed fires can potentially reduce its occurrence due to its sensitivity to fire.

Fluctuations in yearly weather conditions is another influential factor that helps shape the plant communities. Prolonged droughts will dramatically reduce herbaceous cover and production while wet summers will favor black grama dominance and wet winters will favor more mesic and cool-season grasses (Ludwig et al. 2000).

Bison may have utilized this site historically, but access to sufficient perennial water probably limited their stay. The reference community is suited for conservative or planned grazing but overutilization can reduce desirable grasses such as blue grama, green sprangletop, and sideoats grama and increase less desirable grasses such as hairy grama, slim tridens, and perennial threeawn.

The following diagram suggests general pathways that the vegetation on this site might follow. There are other plant communities and states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances; it does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model



LEGEND

1.1A Cool-season rainfall events
1.2A Warm-season rainfall events
1.1B Heavy Continuous Grazing
1.3A Prescribed Grazing or No Grazing Pressure
1.1C Fire Suppression, No Brush Management, Heavy Continuous Grazing
1.4B Prescribed Burning, Brush Management, Prescribed or No Grazing, Warm-season rainfall events
1.2B Heavy Continuous Grazing, Warm-season rainfall events
1.3B Prescribed Grazing or No Grazing Pressure, Cool-season rainfall events
1.2C Fire Suppression, No Brush Management, Heavy Continuous Grazing, Warm-season rainfall events
1.4C Prescribed Burning, Prescribed Grazing or No Grazing, Brush Management, Cool-season rainfall events
1.3C Heavy Continuous Grazing, No Fire, No Brush Management
1.4A Prescribed Grazing or No Grazing, Prescribed Burning, Brush Management
T1A Shrub/Weeds Invasion, Heavy Continuous Grazing, No Fire, No Brush Management
R2A Prescribed or No Grazing, Prescribed Burning, Brush Management

State 1
Grassland/Shrubland State

Midgrass/Shrubs/Trees Community (1.1) is the reference plant community. Blue grama and sideoats grama, and black grama are common grasses. Common shrubs include redberry juniper, skunkbush sumac, wavyleaf oak, and sacahuista. Within this phase, cover of shrubs is approximately 25 percent or lower. Traces of trees such as pinyon pine, gray oak, and alligator juniper occur is some areas, but are not characteristic throughout the entire range of

the site. Cool-season Grasses/Shrubs/Trees Community (1.2) is composed of New Mexico feathergrass, a cool-season grass dominates the grass layer. Other cool-season grasses such as southwestern needlegrass may also increase. Warm-season grasses such as sideoats grama, black grama, and blue grama occur as subdominants. Threeawn/Shrubs/Trees Community (1.3) is dominated by less palatable grasses such as perennial threeawns and hairy grama. Cover of black and blue grama is very low (<5%). With the reduction of grasses this site is very susceptible to shrub encroachment. Juniper/Mixed-grass Community (1.4) occurs due to suppression of fire from natural succession which will allow shrubs (specifically redberry juniper) to increase. Overgrazing can cause this transition as well since it can reduce the fine fuels needed to carry a fire. Depending on grazing pressure this community can either be dominated my increaser or decreaser grasses. There has been no evidence of an alternate stable state with very high canopy cover of juniper (>75 percent) and grasses are completely lost. Catclaw mimosa can increase dramatically in very localized patches often in water receiving areas.

Community 1.1
Midgrass/Shrubs/Trees Community

Figure 4. 1.1 Midgrass/Shrubs/Trees Community

This community phase is the reference plant community. Blue grama, sideoats grama, and black grama are common grasses. Common shrubs include redberry juniper, skunkbush sumac, wavyleaf oak, and sacahuista. Within this phase, cover of shrubs is approximately 25 percent or lower. Traces of trees such as pinyon pine, gray oak, and alligator juniper occur is some areas but are not characteristic throughout the entire range of the site. Annual production ranges from 850 to 1955 pounds per acre. Conservation practices such as prescribed fire and/or prescribed grazing can help maintain this plant community with a diverse mix of species. Lack of any disturbance over time may favor more dominant plant life forms or particular species.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	565	970	1360
Shrub/Vine	190	300	420
Forb	95	130	175
Total	**850**	**1400**	**1955**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-12%
Grass/grasslike foliar cover	20-25%
Forb foliar cover	3-8%
Non-vascular plants	0%
Biological crusts	0%
Litter	8-30%
Surface fragments >0.25" and <=3"	15-45%
Surface fragments >3"	5-10%
Bedrock	0%
Water	0%
Bare ground	20-40%

Figure 6. Plant community growth curve (percent production by month). NM4606, R070DY156NM Gravelly Reference State. R070DY156NM Gravelly Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	8	7	10	25	25	15	5	2	0

Community 1.2
Cool-season Grasses/Shrubs/Trees Community

Figure 7. 1.2 Cool-season Grasses/Shrubs/Trees Community

New Mexico feathergrass, a cool-season grass dominates the herbaceous layer. Other cool-season grasses present in the plant community such as southwestern needlegrass may also increase. Warm-season grasses such as sideoats grama, black grama, and blue grama occur as subdominants.

Community 1.3
Threeawn/Shrubs/Trees Community

This plant community phase is the result of heavy continuous grazing. Less palatable grasses such as perennial threeawns and hairy grama are dominant. Cover of black and blue grama is very low (<5%). With the reduction of grasses, this site is very susceptible to shrub encroachment. In addition, the fine fuels needed to carry fires in reduced. Productivity of annual forbs will be higher in this phase following rain events. Hydrologic function is altered since runoff in increased due to reduced litter and grass cover.

Community 1.4
Juniper/Mixed-grass Community

This community phase is the result of fire suppression and/or heavy continuous grazing. Without fire (a natural succession to the landscape) will allow shrubs (specifically redberry juniper) to increase. Overgrazing can cause this transition as well since in can reduce the fine fuels needed to carry a fire. Depending on grazing pressure this community can either be dominated my increaser or decreaser grasses. There has been no evidence of an alternate stable state with very high canopy cover of juniper (>75 percent) and grasses are completely lost. Catclaw mimosa can increase dramatically in very localized patches often in water receiving areas. Overgrazing can cause an initial increase by reducing herbaceous competition. When fine fuels return with prescribed grazing or no grazing these areas can readily burn. After fire, catclaw mimosa can increase dramatically and create extremely dense patches. Conservation practices such as prescribed burning, brush management, prescribed grazing or no grazing can facilitate a transition back to a warm or cool season reference community with a relatively low cover of shrubs.

Pathway 1.1A
Community 1.1 to 1.2

Midgrass/Shrubs/Trees Community

Cool-season Grasses/Shrubs/Trees Community

Above average cool-season precipitation and rainfall events will cause a shift from a warm-season grass community to a cool-season dominated grass community.

Pathway 1.1B
Community 1.1 to 1.3

Heavy continuous grazing or overutilization will decrease palatable grasses such as black grama and blue grama. Less palatable grasses, such as perennial threeawns and hairy grama increase.

Pathway 1.1C
Community 1.1 to 1.4

The Midgrass/Shrubs/Trees Community will shift to the Juniper/Mixed-grass Community due to fire suppression, no brush management, and heavy continuous grazing.

Pathway 1.2A
Community 1.2 to 1.1

Cool-season Grasses/Shrubs/Trees Community

Midgrass/Shrubs/Trees Community

Above average warm-season precipitation will cause a shift from a cool-season grass community to a warm-season dominated grass community.

Pathway 1.2B
Community 1.2 to 1.3

With heavy continuous grazing pressure and warm-season rainfall events, the Cool-season Grasses/Shrubs/Trees Community will shift to the Threeawn/Shrubs/Trees Community.

Pathway 1.2C
Community 1.2 to 1.4

With fire suppression, no brush management, heavy continuous grazing, and warm-season rainfall events, the Cool-season Grasses/Shrubs/Trees Community will shift to the Juniper/Mixed-grass Community.

Pathway 1.3A
Community 1.3 to 1.1

With Prescribed Burning or No Grazing Pressure and Warm-season rainfall events, the Threeawn/Shrubs/Trees Community will revert back to the Midgrass/Shrubs/Trees Community.

Conservation practices

Prescribed Grazing

Pathway 1.3B
Community 1.3 to 1.2

With Prescribed Grazing or No Grazing Pressure and Cool-season rainfall events, the Threeawn/Shrubs/Trees Community can revert back to the Cool-season Grasses/Shrubs/Trees Community.

Conservation practices

Prescribed Grazing

Pathway 1.3C
Community 1.3 to 1.4

The shift from the Threeawn/Shrubs/Trees Community to the Juniper/Mixed-grass Community occurs due to heavy continuous grazing, no fires, and no brush management.

Pathway 1.4B
Community 1.4 to 1.1

With Prescribed Burning, Prescribed Grazing or no grazing pressure, Brush Management, and Warm-season rainfall events, the Juniper/Mixed-grass Community can revert back to the Midgrass/Shrubs/Trees Community.

Conservation practices

Brush Management

Prescribed Burning
Prescribed Grazing

Pathway 1.4C
Community 1.4 to 1.2

With Prescribed Burning, Prescribed Grazing or no grazing pressure, Brush Management, and Cool-season rainfall events, the Juniper/Mixed-grass Community can revert back to the Cool-season Grasses/Shrubs/Trees Community.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Pathway 1.4A
Community 1.4 to 1.3

With Prescribed Grazing or no grazing pressure, the Juniper/Mixed-grass Community can be reverted back to the Threeawn/Shrubs/Trees Community.

Conservation practices

Prescribed Grazing

State 2
Introduced State

This state is characterized by the introduction of nonnative species such as horehound (*Marrubium vulgare*). This plant was historically introduced as a plant for gardens and can be found in disturbed areas, pastures, and lawns. At Guadalupe Mountains National Park it does not dominate probably due to competition by natives. It is found in areas where livestock were historically concentrated such as old stock pens. Also growing where livestock were concentrated is western honey mesquite, a native shrub or small tree that is found in nearby associated ecological sites. It probably was not part of the historic reference community. Seeds were most likely introduced from other sites by livestock. Mesquite does provide plenty of value to wildlife. It will likely not spread without livestock grazing. Horehound reproduces by seed and fire can kill adult plants (Weiss et al 2000). However, seeds of horehound will readily germinate after fire. Other control options include the use of chemicals or manual control.

Community 2.1
Grass/Shrub Complex Community

Figure 8. 2.1 Grass/Shrub Complex Community (1)

Figure 9. 2.1 Grass/Shrub Complex Community (2)

This state is characterized by the introduction of nonnative species such as horehound (*Marrubium vulgare*). This plant was historically introduced as a plant for gardens and can be found in disturbed areas, pastures, and lawns. At Guadalupe Mountains National Park, it does not dominate probably due to competition by natives. It is found in areas where livestock were historically concentrated such as old stock pens. Also growing where livestock were concentrated is western honey mesquite, a native shrub or small tree that is found in nearby associated ecological sites. It probably was not part of the historic reference community. Seeds were most likely introduced from other sites by livestock Mesquite does provide plenty of value to wildlife. It will likely not spread without livestock grazing. Horehound reproduces by seed and fire can kill adult plants (Weiss et al 2000). However, seeds of horehound will readily germinate after fire. Other control options include the use of chemicals or manual control.

Transition T1A
State 1 to 2

The transition from the Grassland/Shrubland State to the Introduced State occurs due to shrubs and weeds invasion and encroachment, heavy continuous grazing, no fires, and no brush management.

Restoration pathway R2A
State 2 to 1

The Introduced State can be restored to the Grassland/Shrubland State through the implementation of various conservation practices including Prescribed or No grazing, Prescribed Burning, and Brush Management.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm-season bunchgrasses**			130–230	
	sideoats grama	BOCU	*Bouteloua curtipendula*	95–170	–
	blue grama	BOGR2	*Bouteloua gracilis*	30–70	–
2	**Warm-season stoloniferous**			130–230	
	black grama	BOER4	*Bouteloua eriopoda*	130–230	–
3	**Warm-season bunchgrasses**			60–180	

3	**Warm-season bunchgrasses**			60–180	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	15–45	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	15–45	–
	green sprangletop	LEDU	*Leptochloa dubia*	15–45	–
	little bluestem	SCSC	*Schizachyrium scoparium*	15–45	–
4	**Warm-season bunchgrasses**			100–290	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	65–130	–
	common wolfstail	LYPH	*Lycurus phleoides*	10–40	–
	curlyleaf muhly	MUSE	*Muhlenbergia setifolia*	10–40	–
	Hall's panicgrass	PAHA	*Panicum hallii*	10–40	–
	streambed bristlegrass	SELE6	*Setaria leucopila*	10–40	–
5	**Warm-season bunchgrasses**			95–250	
	slim tridens	TRMU	*Tridens muticus*	65–130	–
	threeawn	ARIST	*Aristida*	10–40	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	10–40	–
	hairy woollygrass	ERPI5	*Erioneuron pilosum*	10–40	–
6	**Cool-season bunchgrasses**			30–120	
	southwestern needlegrass	ACEM4	*Achnatherum eminens*	10–40	–
	squirreltail	ELEL5	*Elymus elymoides*	10–40	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	10–40	–
7	**Other grasses**			20–80	
	ring muhly	MUTO2	*Muhlenbergia torreyi*	10–40	–
	burrograss	SCBR2	*Scleropogon brevifolius*	10–40	–
Shrub/Vine					
8	**Fibrous/Succulents**			50–140	
	soaptree yucca	YUEL	*Yucca elata*	30–65	–
	agave	AGAVE	*Agave*	10–35	–
	sotol	DASYL	*Dasylirion*	10–35	–
	sacahuista	NOMI	*Nolina microcarpa*	10–35	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	7–33	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	7–33	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	7–33	–
	common wolfstail	LYPH	*Lycurus phleoides*	7–33	–
	curlyleaf muhly	MUSE	*Muhlenbergia setifolia*	7–33	–
	Hall's panicgrass	PAHA	*Panicum hallii*	7–33	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	7–33	–
	little bluestem	SCSC	*Schizachyrium scoparium*	7–33	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	7–33	–
	pricklypear	OPUNT	*Opuntia*	5–20	–
	tree cholla	CYIMI	*Cylindropuntia imbricata var. imbricata*	5–20	–
9	**Shrubs**			60–160	
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	30–65	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	10–30	–

	Apache plume	FAPA	*Fallugia paradoxa*	10–30	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	10–30	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	10–30	–
10	**Shrubs**			40–60	
	pungent oak	QUPU	*Quercus pungens*	20–40	–
	skunkbush sumac	RHTR	*Rhus trilobata*	20–40	–
11	**Shrubs**			40–60	
	yerba de pasmo	BAPT	*Baccharis pteronioides*	10–40	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	10–40	–
	javelina bush	COER5	*Condalia ericoides*	10–40	–
	jointfir	EPHED	*Ephedra*	10–40	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	10–40	–
	algerita	MATR3	*Mahonia trifoliolata*	10–40	–
	mariola	PAIN2	*Parthenium incanum*	10–40	–
	Pinchot's juniper	JUPI	*Juniperus pinchotii*	10–35	–
Forb					
12	**Forbs**			95–175	
	yarrow	ACHIL	*Achillea*	20–35	–
	dwarf desertpeony	ACNA2	*Acourtia nana*	20–35	–
	croton	CROTO	*Croton*	20–35	–
	fetid marigold	DYPA	*Dyssodia papposa*	20–35	–
	fleabane	ERIGE2	*Erigeron*	20–35	–
	buckwheat	ERIOG	*Eriogonum*	10–35	–
	spurge	EUPHO	*Euphorbia*	20–35	–
	bladderpod	LESQU	*Lesquerella*	20–35	–
	beardtongue	PENST	*Penstemon*	20–35	–
	plantain	PLANT	*Plantago*	20–35	–
	woolly paperflower	PSTA	*Psilostrophe tagetina*	20–35	–
	senna	SENNA	*Senna*	20–35	–
	globemallow	SPHAE	*Sphaeralcea*	20–35	–
	verbena	VEPO4	*Verbena polystachya*	20–35	–
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	10–25	–

Inventory data references

Data collection for this site was done in conjunction with the progressive soil surveys within the Pecos-Canadian Plains and Valleys Major Land Resource Area of New Mexico (MLRA 70).

This site has been mapped and correlated with soils in the following soil surveys: Otero, Eddy, Chaves, and Lincoln.

Other references

References:

1. Brown, J. R. and S. Archer. 1999. Shrub invasion of grassland: recruitment is continuous
And not regulated by herbaceous biomass or density. Ecology 80:2385-2396.

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

3. Wright, H.A., and A.W. Bailey. 1982. Fire ecology: United States and southern Canada. New York: John Wiley and Sons. 501p.

Contributors

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Approval

Kendra Moseley, 10/21/2024

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	11/13/2024
Approved by	Kendra Moseley
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:**

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

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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:**
