USDA Natural Resources Conservation Service

Ecological site R042CY745TX
Limestone Canyon Bottomland

Accessed: 05/04/2024

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.

Associated sites

F042CY020TX	**Limestone Mountain (North Aspect) 20-26" PZ** Limestone Mountain (North Aspect) is on steep north facing slopes mostly above 2,286 m in elevation. Soils are mostly shallow to limestone bedrock and clayey. The reference plant community is a mixed conifer forest.
F042CY021TX	**Limestone Mountain (South Aspect) 20-26" PZ** The Limestone Mountain (South Aspect) occurs on mountain slopes and ridgetops, at elevations generally above 2,286 m. Aspects are predominantly south facing or neutral. Soils are mostly shallow to limestone bedrock, gravelly, and loamy. The reference plant community is a ponderosa pine savanna.
R042CY102NM	**Shallow Limestone** Shallow Limestone occurs on limestone hills with 10 to 50 percent slope gradient. Soils are shallow to limestone bedrock. HCPC is mixed prairie grassland with scattered forbs, shrubs, and trees.
R042CY109NM	**Loamy** Loamy is a flood plain, stream terrace, arroyo, or basin floor with nongravelly or cobbly soils. HCPC is mixed prairie grassland with scattered shrubs, forbs, and trees.
R042CY115NM	**Breaks** Breaks are escarpments with slopes ranging 40-95 percent gradient. Soils are shallow to bedrock. HCPC is a mountain shrubland with few scattered trees.

Similar sites

R042CY109NM	**Loamy** Loamy is a flood plain, stream terrace, arroyo, or basin floor with nongravelly or cobbly soils. HCPC is mixed prairie grassland with scattered shrubs, forbs, and trees.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The site occurs on nearly level mountain canyons and drainageways that are occasionally to frequently flooded. Runoff is negligible on 0 to 1 percent slopes and low on slopes over 1 percent. Elevation ranges from 5000 to 6400 feet. The site is occasionally to frequently flooded.

Table 2. Representative physiographic features

Landforms	(1) Canyon (2) Drainageway
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	1,524–1,951 m
Slope	0–3%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of the area is "semi-arid continental."

The average annual precipitation ranges from 13 to 16 inches. Variations of 5 inches, more or less, are not uncommon. Seventy-five percent of the precipitation falls from April to October. Most of the summer precipitation comes in the form of high intensity-short duration thunderstorms.

Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature is about 50 degrees F with extremes of -29 degrees F in the winter and 103 degrees F in the summer.

The average frost-free season is 130 to 160 days. The last killing frost falling in early May and the first killing frost in early October.

Both temperature and precipitation favor warm-season perennial species. However, about 40 percent of the annual precipitation falls at a time favorable to cool-season plant growth. The soils of this site can store water from winter and early spring moisture for use by cool-season species. This allows the cool-season species to occupy an important component of this site. Strong wind from the west and southwest that blow from February to June can rapidly dry the soil profile during a critical period for cool-season plant growth.

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)	173 days
Freeze-free period (average)	187 days
Precipitation total (average)	406 mm

Influencing water features

Soil features

The site consists of very deep and well drained soils that formed in gravelly alluvium derived mostly from limestone. Permeability is moderately rapid. Typically, the surface layer is dark grayish brown gravelly sandy loam. Riverwash consists of areas of cobbles and gravels in the main stream channel. These areas typically have little to no vegetation and undergo repeated high intensity flash flooding.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone

Surface texture	(1) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	41–157 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–20%
Calcium carbonate equivalent (0-101.6cm)	0–25%
Electrical conductivity (0-101.6cm)	0–1 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The reference plant community for this site is a riparian woodland that consists of mixed hardwoods, pines, shrubs, and both mid and tall grasses. The vegetation of this site occurs on the banks of a streambed and its first terrace or active floodplain. The riverwash, or streambed, is a component of the map unit but it is not correlated with an ecological site because it lacks stable vegetation. However, vegetation does begin to establish once alluvial deposits begin to stabilize.

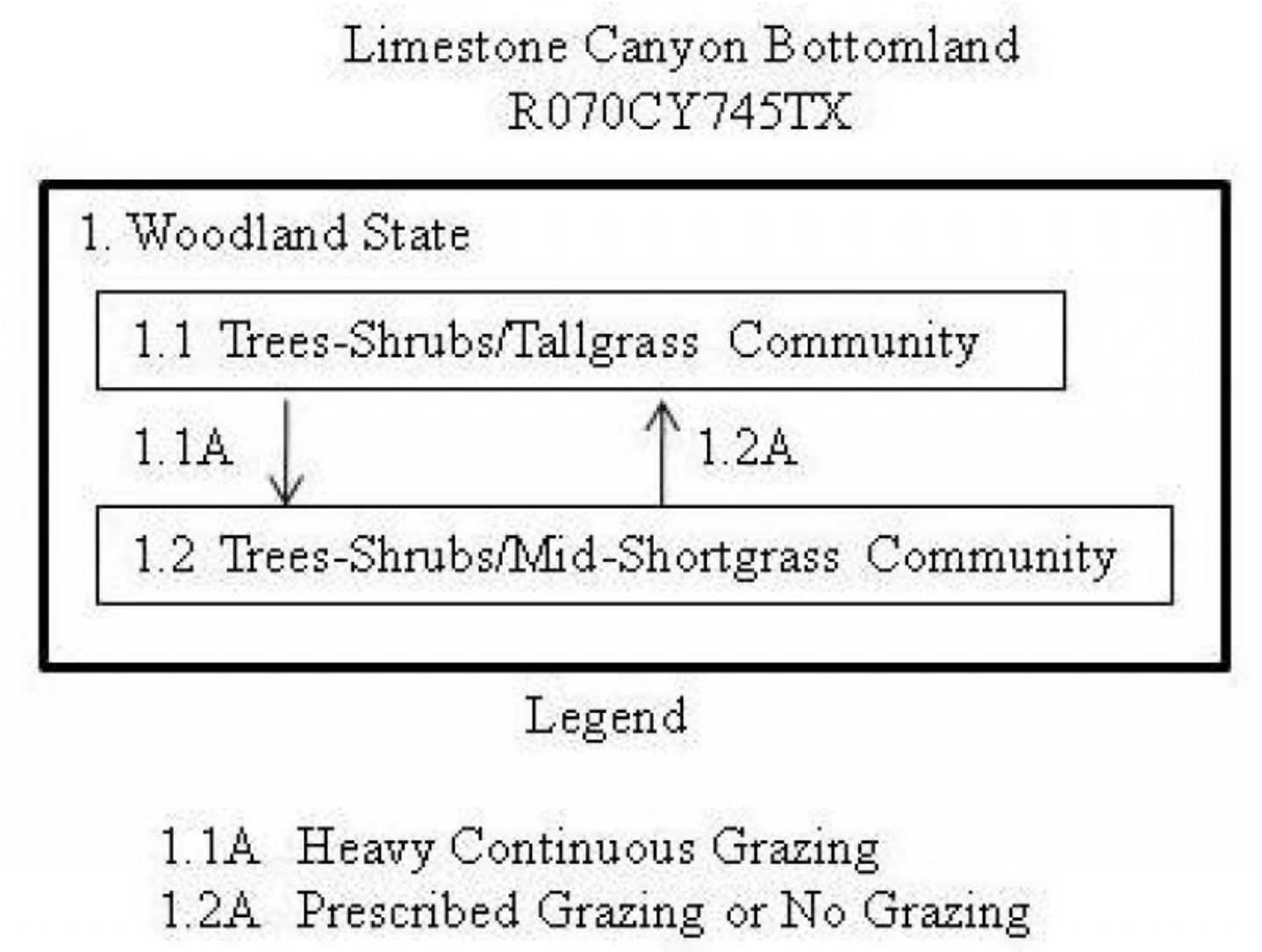
Vegetation within this site is a dynamic complex of discontinuous plant communities responding to numerous environment controls such as watershed area, terrace shape and width, nature and relative position of depositional features such as terraces, gravel bars, frequency and amount of runoff, alluvial fragment size, depth of bedrock, and presence of perennial water sources. With the exception of perennial springs in some locations, canyon bottomlands are dry most of the year. They are subject to flash floods during the summer rainy season. It may be reasonable to assume that during pre-settlement times, plant communities along arroyos existed as a shifting mosaic.

The most significant natural disturbance that has historically and currently is still shaping the plant communities is flash floods. The severity of these floods and their effects vary. Generally, there is very little fire activity in this riparian zone due to high moisture levels (NPS 2005). The natural breaks present in wetter, rockier canyon bottoms limit the extent of fires when they do move in from neighboring communities (NPS 2005).

Many types of wildlife utilize this site currently and most likely did so in the past. Mule deer is probably the most frequently seen native grazer/browser utilizing this site.

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



State 1
Woodland State

The Trees-Shrubs/Tallgrass Community is characterized by several plant community potentials resulting from different plant environments. Narrow canyon bottoms will have limited daily sunlight and will typically have a high canopy cover percentages of trees such as bigtooth maple, chinkapin oak, alligator juniper, and ponderosa pine. Shade tolerant grasses will coexist. As the bottomland widens, tree canopy cover decreases and shade intolerant grasses increase. Scouring flash floods and small wildfires will maintain a discontinuous mosaic of plant communities. Annual production ranges from 2450 to 5250 pounds per acre. The Trees-Shrubs/Mid-Shortgrass Community is characterized by a herbaceous component that consists mostly of unpalatable mid and shortgrasses such as hairy grama and perennial threeawns. Tallgrasses such as yellow indiangrass, big bluestem, and littlebluestem will be subdominants. In some areas, shrubs such as sotol and catclaw mimosa will increase.

Community 1.1
Trees-Shrubs/Tallgrass Community

Figure 4. 1.1 Bigtooth maple with few grasses

Figure 5. 1.1 Bigtooth maple, chinkapin oak, pine muhly and

Figure 6. 1.1 Stream with Jamaica sawgrass and mixed shrubs

Figure 7. 1.1 Little bluestem/muhly with oak, juniper, and p

This site is characterized by several plant community potentials resulting from different plant environments. Narrow canyon bottoms will have limited daily sunlight and will typically have a high canopy cover percentages of trees such as bigtooth maple, chinkapin oak, alligator juniper, and ponderosa pine. Shade tolerant grasses will coexist. As the bottomland widens, tree canopy cover decreases and shade intolerant grasses increase such as littlebluestem, big bluestem, yellow indiangrass, bull muhly, pine muhly, and sideoats grama. Common shrubs include sotol, desert ceanothus, cliff fendlerbush, Mexican orange, apache plume, skunkbush sumac, and New Mexico agave. Grass-likes such as Jamaica sawgrass and bottlebrush sedge grow along the banks of perennial streams or areas with a very shallow groundwater depth. Scouring flash floods and small wildfires will maintain a discontinuous mosaic of plant communities.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	1121	2242	3363
Grass/Grasslike	897	1121	1345
Shrub/Vine	673	897	1121
Forb	56	112	168
Total	**2747**	**4372**	**5997**

Figure 9. Plant community growth curve (percent production by month). NM4325, Trees-Shrubs/Tallgrass Community. Mixture of oaks, junipers, and pines with tallgrasses such as big bluestem, little bluestem, and indiangrass..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	2	4	6	9	14	24	24	7	4	2	2

Community 1.2
Trees-Shrubs/Mid-Shortgrass Community

This plant community phase is characterized by a herbaceous component that consists mostly of unpalatable mid and shortgrasses such as hairy grama and perennial threeawns. Tall grasses such as yellow indiangrass, big bluestem, and littlebluestem will be subdominants. In some areas, shrubs such as sotol and catclaw mimosa will increase.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	1121	2242	3363
Grass/Grasslike	897	1121	1345
Shrub/Vine	673	897	1121
Forb	56	112	168
Total	**2747**	**4372**	**5997**

Figure 11. Plant community growth curve (percent production by month). NM4326, Trees-Shrubs/Mid/Shortgrass Community. Mixture of oaks, junipers, and pines with shortgrasses such as hairy grama and threeawn species..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	5	7	9	14	24	24	8	5	1	1

Pathway 1.1A
Community 1.1 to 1.2

Heavy continuous grazing by domestic cattle will shift the grass dominance from the palatable tall grasses to the less palatable mid and shortgrasses such as perennial threeawn and hairy grama. Overutilization by goats can potentially limit the reproduction of maples, Texas madrone, mountain mahogany, and other palatable browse.

Pathway 1.2A
Community 1.2 to 1.1

The Trees-Shrubs/Mid-Shortgrass Community can be restored back to the Trees-Shrubs/Tallgrass Community with Prescribed grazing or no grazing which will allow the tallgrasses to recover.

Conservation practices

Prescribed Grazing

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	**Warm-season Tallgrasses**			448–673	
	big bluestem	ANGE	*Andropogon gerardii*	112–336	–
	bullgrass	MUEM	*Muhlenbergia emersleyi*	112–336	–
	little bluestem	SCSC	*Schizachyrium scoparium*	112–336	–
	Indiangrass	SONU2	*Sorghastrum nutans*	112–336	–
2	**Midgrasses**			235–336	
	sideoats grama	BOCU	*Bouteloua curtipendula*	56–112	–
	blue grama	BOGR2	*Bouteloua gracilis*	56–112	–
	pine muhly	MUDU	*Muhlenbergia dubia*	56–112	–
	New Mexico muhly	MUPA2	*Muhlenbergia pauciflora*	56–112	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	34–67	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	34–67	–
	curlyleaf muhly	MUSE	*Muhlenbergia setifolia*	28–56	–

3	**Shortgrasses**			34–67	
	purple threeawn	ARPU9	*Aristida purpurea*	17–34	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	17–34	–
	western panicgrass	DIACF	*Dichanthelium acuminatum var. fasciculatum*	17–34	–
	hairy woollygrass	ERPI5	*Erioneuron pilosum*	17–34	–
	common wolfstail	LYPH	*Lycurus phleoides*	17–34	–
	Hall's panicgrass	PAHA	*Panicum hallii*	17–34	–
4	**Cool-season grasses**			135–202	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	28–56	–
	squirreltail	ELEL5	*Elymus elymoides*	17–34	–
	pinyon ricegrass	PIFI	*Piptochaetium fimbriatum*	17–34	–
	Arizona fescue	FEAR2	*Festuca arizonica*	11–28	–
	threeflower melicgrass	MENI	*Melica nitens*	11–28	–
5	**Grasslikes**			45–67	
	bottlebrush sedge	CAHY4	*Carex hystericina*	22–45	–
	Jamaica swamp sawgrass	CLMAJ	*Cladium mariscus ssp. jamaicense*	22–45	–
Shrub/Vine					
6	**Shrubs**			471–785	
	desert ceanothus	CEGR	*Ceanothus greggii*	39–84	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	39–84	–
	Mexican orange	CHDU	*Choisya dumosa*	39–84	–
	damianita	CHME3	*Chrysactinia mexicana*	39–84	–
	javelina bush	COER5	*Condalia ericoides*	39–84	–
	Apache plume	FAPA	*Fallugia paradoxa*	39–84	–
	cliff fendlerbush	FERU	*Fendlera rupicola*	39–84	–
	eggleaf silktassel	GAOV	*Garrya ovata*	39–84	–
	western white honeysuckle	LOAL	*Lonicera albiflora*	39–84	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	39–84	–
	pungent oak	QUPU	*Quercus pungens*	39–84	–
	skunkbush sumac	RHTR	*Rhus trilobata*	39–84	–
	evergreen sumac	RHVI3	*Rhus virens*	39–84	–
	arroyo willow	SALA6	*Salix lasiolepis*	39–84	–
7	**Fibrous/Succulents**			168–280	
	green sotol	DALE2	*Dasylirion leiophyllum*	39–112	–
	Texas sacahuista	NOTE	*Nolina texana*	28–84	–
	pricklypear	OPUNT	*Opuntia*	28–84	–
	slimfoot century plant	AGGR4	*Agave gracilipes*	28–84	–
	Parry's agave	AGPAN6	*Agave parryi ssp. neomexicana*	28–84	–
8	**Vines**			34–56	
	bluebill	CLPIP	*Clematis pitcheri var. pitcheri*	17–34	–
	canyon grape	VIAR2	*Vitis arizonica*	17–34	–

Tree					
9	**Trees**			1121–3363	
	bigtooth maple	ACGR3	*Acer grandidentatum*	112–560	–
	ponderosa pine	PIPO	*Pinus ponderosa*	112–560	–
	gray oak	QUGR3	*Quercus grisea*	112–560	–
	chinquapin oak	QUMU	*Quercus muehlenbergii*	112–560	–
	twoneedle pinyon	PIED	*Pinus edulis*	112–448	–
	alligator juniper	JUDE2	*Juniperus deppeana*	112–448	–
	little walnut	JUMI	*Juglans microcarpa*	84–168	–
	common hoptree	PTTR	*Ptelea trifoliata*	84–168	–
	black cherry	PRSE2	*Prunus serotina*	84–168	–
	Texas madrone	ARXA80	*Arbutus xalapensis*	84–168	–
	velvet ash	FRVE2	*Fraxinus velutina*	84–168	–
	Pinchot's juniper	JUPI	*Juniperus pinchotii*	28–112	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	17–84	–
	oneseed juniper	JUMO	*Juniperus monosperma*	17–84	–
	Rocky Mountain Douglas-fir	PSMEG	*Pseudotsuga menziesii var. glauca*	17–84	–
Forb					
10	**Perennials**			56–168	
	Forb, perennial	2FP	*Forb, perennial*	11–28	–
	golden columbine	AQCH	*Aquilegia chrysantha*	6–17	–
	butterfly milkweed	ASTU	*Asclepias tuberosa*	6–17	–
	greeneyes	BERLA	*Berlandiera*	6–17	–
	Mexican cancer-root	COALM	*Conopholis alpina var. mexicana*	6–17	–
	buckwheat	ERIOG	*Eriogonum*	6–17	–
	needleleaf bluet	HOACA2	*Houstonia acerosa var. acerosa*	3–17	–
	menodora	MENOD	*Menodora*	6–17	–
	beardtongue	PENST	*Penstemon*	6–17	–
	polygala	POLYG	*Polygala*	3–17	–
	noseburn	TRAGI	*Tragia*	3–17	–
11	**Annuals**			3–11	
	Forb, annual	2FA	*Forb, annual*	3–11	–

Animal community

Some portions of the site can be suited for conservative livestock grazing. Riparian areas, however, can be very sensitive to overutilization. A reduction in herbaceous composition can make the site more susceptible erosion especially when flash floods occur.

Mule deer are one of the most common animals seen in this site. Nocturnal mammals such as skunks and raccoons can also be found here. Long-ear sunfish can be seen in some of the springs in the park, as well as in McKittrick Canyon. The stream through McKittrick Canyon is also home to a small population of rainbow trout. Although amphibians are rare in the desert, the Rio Grande leopard frog can occasionally be encountered near spring fed pools in McKittrick Canyon, or at Manzanita and Smith Springs. Rocky canyons are home to ringtails, rock squirrels, and a variety of reptiles including rock and black-tailed rattlesnakes, mountain patchnose snakes, and tree lizards (NPS).

Plant Preference by Animal Kind:
These preferences are somewhat general in nature as the preferences for plants is dependent upon grazing experience, time of year, availability of choices, and total forage supply.

Legend: P=Preferred D=Desirable U=Undesirable N=Not Consumed T=Toxic X=Used, but not degree of utilization unknown
Preferred – Percentage of plant in animal diet is greater than it occurs on the land
Desirable – Percentage of plant in animal diet is similar to the percentage composition on the land
Undesirable – Percentage of plant in animal diet is less than it occurs on the land
Not Consumed – Plant would not be eaten under normal conditions. Only consumed when other forages not available.
Toxic – Rare occurrence in diet and, if consumed in any tangible amounts results in death or severe illness in animal

Hydrological functions

The site is located in both a surface water run-in and runoff position. Depth to groundwater effects species composition.

Recreational uses

The site can be used for hiking.

Wood products

None.

Other products

None.

Other information

None.

Inventory data references

Information presented here has been developed from NRCS clipping, composition, plant cover, soils data and ecological interpretations gained by field observation.

Contributors

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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):**

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:

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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:**
